EKISTICS

ABSTRACTS ON THE PROBLEMS AND SCIENCE OF HUMAN SETTLEMENTS

ΟΙΚΙΣΤΙΚΗ

SEPTEMBER • 1960

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E K I S T I C S

ABSTRACTS

of

THE PROBLEMS AND SCIENCE OF HUMAN SETTLEMENTS

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Consulting Engineers
24, Strat. Syndesmou
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Philadelphia, Pennsylvania, U.S.A.
By Doxiadis Associates

TABLE OF CONTENTS

EDITORIAL		139
ABSTRACTS ON HOUSING, PLANNING AND CONSTRUCTION		
Utopian Aspects of Tony Garnier's Cité Industrielle (with illustrations p. 147)	Dora Wiebenson	143
Prince Rupert, British Columbia: A New Town That Never Grew Up (with illustrations p. 149)	P. C. McGovern	148
Building in the Arctic (with illustrations pp. 153, 155)	Ralph Erskine	152
Faridabad--A Critical Study of the New Town (with illustrations pp. 157, 161, 163)	L. R. Vagale, B. M. Bhuta, and M. S. V. Rao	156
Report of the Committee of Inquiry Into the Design of the Residential Environment of the Royal Architectural Institute of Canada (with illustration p. 141)	Peter Dobush, John C. Parkin and C. E. Pratt	166
Chemistry's Man-made Plastics (with illustrations p. 175)	William Demarest	173
Structural Considerations (with illustrations pp. 179, 181)	Frederick J. McGarry	178
Residential Research (with illustrations pp. 184, 185)	Lee Frankl	183
Use of Population Data in the Analysis of Economic Development Problems	Carlos Oyarzún Salinas	187
Population Census Tabulations for Economic and Social Policy Making in Countries of Asia and the Far East	United Nations Bureau of Social Affairs	190

WORK OF DOXIADIS ASSOCIATES

Eastwick Redevelopment Project — Doxiadis Associates — 195

APPENDIX

Recent Publications — 216

EKISTICS is compiled by Mrs. Gwen Bell under the direction of Prof. J. Tyrwhitt.

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NOTE: The figures below each title refer to the Universal Decimal Classification.

EDITORIAL

A notable piece of news can be recorded this month: a limited competition for the development of a large new urban tract in the city of Philadelphia has been won by Doxiadis Associates. The project is briefly described at the end of the issue and it is interesting to compare it with four other planned settlements which have been the subject of recent articles.

The Ideals of Planned Settlements

The opening article gives an account of Tony Garnier's Cité Industrielle (first conceived in 1899) in the light of current utopian ideals. These can be summarized as:

1. Decentralization of government.
2. Build up of regional culture and local industries.
3. Contact with nature.
4. Use of latest technical developments.

Tony Garnier interpreted these by defining specialized functional zones (what we would now call "urban sectors") for government, sport, industry, hospitals, etc.; isolating the industrial and hospital sectors by broad tracts of countryside (what we would now call "green belts"); introducing small parks and pedestrian footpaths between the houses (what we would now call "green ways"); and making great use of new sources of power (then hydro-electricity) and materials (then reinforced concrete). He was also one of the first designers to link his elements lineally along major (separated) traffic routes. It was this emphasis on the connecting qualities of segregated transportation routes that caused Tony Garnier's plan to be called "lineal" and has given rise to the recent revival of interest in his 60 years old project.

Prince Rupert was a planned town that failed, built in the far Northwest of Canada in the early years of this century. Its undistinguished design shows the utopian trends current at that time: the overlarge "beaux arts" scale of its axial, park-like central mall (unbuilt-up to this day) and the romantic back-to-nature curlicues of its residential streets of single family houses and gardens.

Another planned town, heavily criticized in this issue, is Faridabad, 17 miles from Delhi. This was also based on ideologies: the value of "decentralizing" industry; the value of self-contained "new towns" where people both live and work; the value of domestically self-contained "neighbourhood units"; the value of "green belts" as dividers; the value of an open park-like town center.

The "critical evaluation" intended by the staff of the Delhi School of Town & Country Planning turns out to be a clear and honest statement of the present position in the new town and then a list of adverse criticisms: an "evaluation" is missing. However, it provides the basis for a more fruitful exercise than the re-planning of Chandigarh by Philadelphia students in last month's EKISTICS, as this started off by completely changing the conditions upon which that city had to be designed.

A disappointing report from a group of Canadian Architects purports to outline "the objectives to be sought in the design and layout of the total residential environment." In fact the report is confined to residential dwellings and to saying--very persuasively--that these should be varied in type to suit different family sizes and needs.

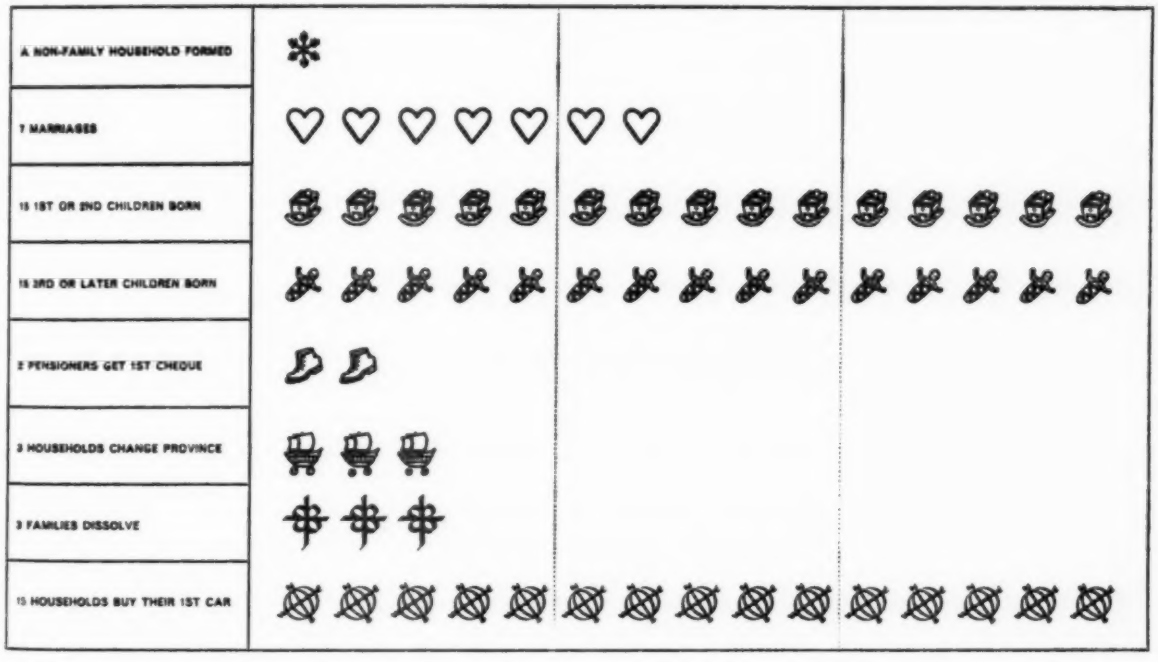
Coming nearer to the ideologies of our own time is the outline of a method of planning for new settlements in the far north. Here Ralph Erskine lays value on the "Human scale" (or the domestic scale) of the immediate home environment: in other words a compact relationship of dwellings with their closely related services (what we today call the compact housing "cluster"). At the same time he stresses the need for a built-in awareness of the wider landscape. This is an interesting and provocative article, closely similar in many of its deductions to the work, in 1954, of the Canadian "Cool Crowd" and--indirectly--strongly critical of the plans of such settlements as Prince Rupert and Kitimat.

Finally a word on the Doxiadis plan for Eastwick, Philadelphia. The values he accepts are listed on page 198, but can be described as an acceptance of several of the devices used by Tony Garnier interpreted in the spirit of the twentieth century. We find the specialized "urban sector" separated and linked by major traffic routes and the compact "housing clusters" related to a "pedestrian green way." But here the green way has been expanded to become a pedestrian oriented linear center which threads through the whole "residential sector." This is a notion which was also put forward in the unrealized Sert-Le Corbusier plan for Bogota (1953). The device has the advantage of giving local coherence to the small scale housing clusters while avoiding the self-containment of the "neighbourhood unit" notion.

PLASTICS: A NEW MATERIAL FOR NEW SETTLEMENTS

Man-made plastics have been heralded as the new material for construction in the second half of the twentieth century: the equivalent of reinforced concrete at the time of Tony Garnier. Much of this talk has been in platitudes about "miracle" materials, but in the articles by William Demarest, Frederick McGarry, and Lee Frankl, a practical approach is taken to the potential of plastics. The general article by William Demarest gives an overall outline of what the different kinds of plastics are and their capabilities. Frederick McGarry frankly discusses how they have been well used

CHART III: THESE CHANGES OF HOUSEHOLD CIRCUMSTANCES OCCUR EVERY HALF HOUR IN CANADA


A NON-FAMILY HOUSEHOLD FORMED
7 MARRIAGES
15 1ST OR 2ND CHILDREN BORN
15 3RD OR LATER CHILDREN BORN
2 PENSIONERS GET 1ST CHEQUE
3 HOUSEHOLDS CHANGE PROVINCE
3 FAMILIES DISSOLVE
15 HOUSEHOLDS BUY THEIR 1ST CAR

From "Report of the Committee of Inquiry into the Design of the Residential Environment of the Royal Architectural Institute of Canada, Ottawa." See pages 166-172.

and misused in building, with some criteria as to when it is wise to use plastics. Lee Frankl outlines his own experience "building in his backyard" with plastics.

PLANNING FOR THE POPULATION

EKISTICS has abstracted a large number of United Nations sponsored reports on population analysis during this last year. This is partially because 1960 is a census year in most every country of the world. The two articles this month point out first, the questions which can be answered to the planner in the census, and second those parts of the census questionnaire which provide the basic data for the planner.

Wiebenson, Dora
UTOPIAN ASPECTS OF TONY GARNIER'S CITÉ INDUSTRIELLE
"Journal of the Society of Architectural Historians," Volume XIX, Number 1, March 1960. Pages 16-24. Illustrations.
711.41 (100)

1. The Cité Industrielle of Tony Garnier was illustrated and briefly discussed in the April 1960 EKISTICS, "Linear Planning Throughout the World." The following, from a M.A. dissertation at New York University, investigates it more closely.

2. This project for an industrial city was first conceived by Tony Garnier (1867-1948) in 1899 when he was a student at the École des Beaux-Arts in Paris. When Garnier went as a Prix de Rome winner to the French Academy in Rome, he began developing his original concept into a city plan of very wide scope, incorporating the most advanced social and technical ideas of his time. Although the first stage of the project was exhibited in 1901, and the second stage in 1904, Garnier probably continued work on the Cité until the year of its publication in 1917.

3. The Cité Industrielle is situated on a plateau with high land and a lake to the north, a valley and a river to the south. The main area of the city includes the residences and the public buildings. The public buildings are grouped into three sections; the administrative services and assembly rooms, the collections, and the sports and spectacles. The residential area is composed of rectangular blocks, running east-west, which give the city its characteristic linear form. A main artery connects the station quarter to the city. On the northeast side of this quarter is the old town. South of this quarter is the large metallurgic factory area. Mines related to the factory are on the east side of the river. A silk manufacturing factory is to the north of the old city. Above this area is the source of the city's power--the hydroelectric station and the dam. To the southwest of the dam, and sheltered by the mountains behind it, is the hospital plant. All these major areas are separated from each other by green belts. Small areas are developed for other uses along the river bank and in the plateau territory. Sections of the surrounding region are rendered as regularly planted fields, indicating agricultural development. It can be seen that Garnier included governmental, cultural, residential, manufacturing and agricultural facilities within his concept of a city.

4. Garnier's Cité is closely related to the early nineteenth-century Utopias. Its literary counterpart, Emile Zola's "Travail," written contemporaneously with the planning of the Cité, is almost entirely based on the early socialist Utopian doctrines of Fourier. Garnier, like Fourier, believed in the basic goodness of man, and when asked why his city contained no law court, police force, jail, or church, replied that the new society, governed by socialist law, would have no need of churches, and that, as capitalism would be suppressed, there would be no swindlers,

robbers, or murderers. Garnier went beyond the elimination of contemporary social restraints and introduced building types based on socialist tenets. Thus employment services and free hostels, as well as the many meeting rooms, were created for the syndicates that such a form of government presupposed. Public facilities were emphasized. Equality of the sexes in education was assumed. Courts for arbitration were included, substituting for the usual law courts. Public services, such as slaughter houses, flour mills, bakery, dairy, and pharmaceutical products, were placed under the jurisdiction of the administration. The administration was also concerned with regulation of the dam, and electrical output, including heat and light, as well as the more usual functions of street cleaning, etc.

5. The Cité Industrielle compares in other aspects with Utopian thought. In nineteenth-century Utopias nature, and all types of life related to nature, were considered good. The ideal qualities of fraternity, goodness, and work were assumed to be a fundamental part of man's behavior. Religion was discarded, and to some extent a worship of nature was substituted. In a characteristic nineteenth-century parallel of architectural expression with symbolic content, Garnier bases his architectural style on the long horizontals and verticals of the buildings, which, in their simplicity, were to harmonize with natural forms. The consciousness of exercise, health, and physical well-being were a response to the wakening interest in the simple life. Garnier's emphasis on sports, as seen in the large public area he devotes to sports and spectacles, had its foundation in this philosophy, which looked backward to a more 'natural' antiquity with its love of games. Another direction that this emphasis on nature took was a greater use of natural settings within planning: this found expression in the garden city as well as Garnier's park-like Cité Industrielle.

6. The Cité demonstrates the real as well as the ideal side of Utopian thought. For instance, the necessity for a realistic basis for Utopian thinking caused Garnier's Cité to be related to the politically active French regionalist movement in its general concept rather than to earlier and more abstract Utopian schemes. At the time of its creation the Cité Industrielle included all elements of French regionalism; governmental decentralization, regional universities and museums, local historical monuments and sites, encouragement of native arts and crafts, and local industries. In addition, the deliberate relation of the old town to the station, as if to make visits for sightseers easier, can also be understood as an interpretation of the regionalist philosophy of the preservation and fostering of interest in local monuments.

7. Garnier's Cité Industrielle also includes some of the goals toward which regionalism, through actual municipal reforms, was oriented. By the turn of the century, municipal reforms placed great emphasis on practicality of expansion and the zoning of the various functions of the city, as well as stringent building laws relating to interior courts and regulations of the maximum amount of site to be used for building. In the Cité factories, shipping yards, and railroad stations were removed from the city center and grouped together. The future growth of the Cité is carefully stressed in Garnier's preface, though

there is no provision for the expansion of the center of the city or for growth of the traffic system, if expansion should occur. The various functions of the city, such as industry, residences, and public, administrative, and hospital quarters are emphatically separated from each other by green belts for independent expansion. They are also related to each other for functional proximity and for ease of transportation. Garnier excels in the organic interrelationship of the various sections of the city, and it is more this factor than any other which has caused him to be accepted as the first twentieth century planner. Southern orientation for all bedrooms is stressed. Light wells are banned, and density and building heights are carefully regulated, not in terms of appearance, but in terms of the establishment of ideal conditions of hygiene. All tall buildings are placed within the station quarter to free the rest of the city, and the park-like nature of the city is achieved by carefully zoning the area of the building on its plot and by providing right-of-ways between buildings as well as banning walls, fences, and other enclosures.

8. The latest technical developments are basic assumptions in the plan and Garnier relies heavily on them. One important technical achievement of the 1890's was electricity, which occupied a recent and important place in the widening field of architecture and planning, though it was not until the 1900 exhibition that this development assumed a role of primary importance. Garnier included a hydroelectric plant in the Cité Industrielle. Electricity was associated with a future mastery of the machine and the emancipation of man from enslavement; in particular, its cleanliness made it attractive for inclusion in a city of the future. The reaction against the dirt and waste of early manufacturing towns placed this advancement high on the list of the nineteenth-century reformer.

9. Also, reinforced concrete at this period was of major importance because of its unlimited potentialities. Contemporary publications heralded concrete as the material of the future and idealized its character. It was the association of this material with an ideal future state rather than its technical aspect that was uppermost in Garnier's mind when he chose it as the material for his Cité Industrielle. In fact, techniques were so small a problem to him that in his publication of the Cité there are no technical data on concrete.

10. Garnier does not follow one system of reinforced concrete for the development of his material, but borrows freely from all systems available to him. The chamfered edges of columns and the post, beam and joist system of construction used in his assembly building (Fig. 11) are important features of the Hennebique system which must have fascinated Garnier as he watched the erection of Hennebique's buildings for the 1900 Paris exhibition. Baudot's use of simplified concrete tracery in the church of Saint-Jean de Montmartre of 1894 is paralleled in the tracery of Garnier's assembly building, while the use of reinforced concrete as a skeletal material containing in its structure its own decoration (an exception to Garnier's philosophy of separate architecural and ornamental forms, and similar to Baudot's use of concrete) is seen in

Garnier's station tower (Fig. 13). In this tower concrete has a more direct relationship to iron, especially to the expression of this material in the Eiffel Tower. Only in the station and the stadium does Garnier dramatize the lightness and strength of reinforced concrete by using thin members, glass curtain walls, and wide cantilevers. Thus, though Garnier understands the basic cast character of concrete, his emphasis on its technical aspects is superficial, and his exploitation of its possibilities, derivative.

11. Garnier envisions a simple, Arcadian age which was expressed in several other projects in the 1890's. In Olmsted's landscaping of the Columbian Exposition of 1893 the setting was romanticized, especially in the secluded, natural, and 'sylvan aspect' of the Lagoon, which was an important feature in the conception of the Fair. Wagner's scheme for the remodeling of Vienna, begun in 1898, also had, to a less obvious degree, similar elements in the central municipal area, where a larger rectangular pool in a park was bordered by poplars and covered walkways. The use of the reflective qualities of the pool and the shimmering white of the buildings in both of these schemes, as well as the importance of landscape architecture as a setting for the architectural monuments, is descriptive of the style called by Tunnard the 'Arcadian revival.' This term implies a return directly to antique, and thus to pagan, forms. It also implies a growing interest in the spirit of ancient architecture--in its municipal character, its feelings for beauty as a function meaningful in society, and its utilization of art. And within the context of this revival Garnier's Cité Industrielle becomes especially meaningful. The Cité is an ideal project based on Utopian tenets with Arcadian implications, a monumentally conceived and co-ordinated plan returning in style to antique forms and in philosophy to the antique spirit that are behind the academic tradition.

Fig. 11.
Cité).

Fig. 11. Project for an assembly building, by Garnier (from Garnier, *Cité*).

Fig. 13. Project for a station, by Garnier (from Garnier, *Cité*).

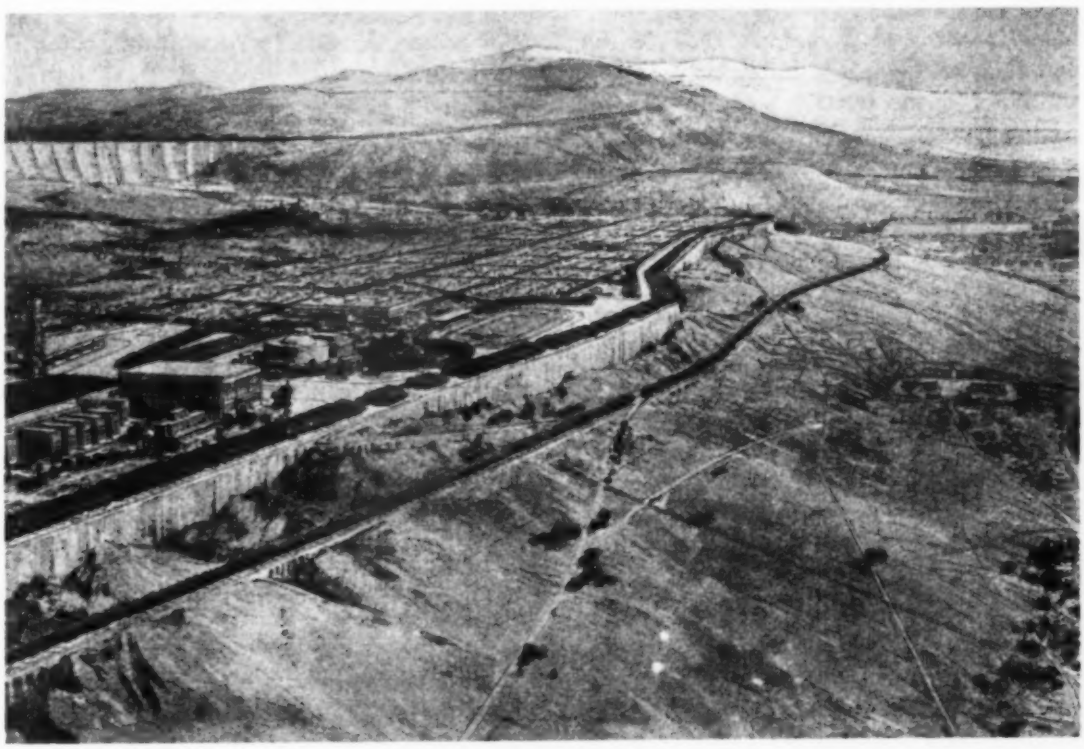


Fig. 14. View, Cité Industrielle, by Garnier (from Garnier, *Cité*).

McGovern, P. C.
PRINCE RUPERT, BRITISH COLUMBIA: A NEW TOWN THAT NEVER GREW UP
"Town and Country Planning," April-May 1960. Pages 135-139. Illustrations.
711.41 (98) (71)

1. Prince Rupert provides an example of a town in the sub-arctic, planned with taking into consideration the essentials of the human and physical situation. The story of this town, dramatizes the need for building in regard to the environment.

2. The rugged coast of British Columbia is a magnificent natural environment where mountains fall steeply into the sea, their slopes thickly covered in virtually impenetrable forests. Deep fjords provide passages to the heart of the range, but most of them end at glaciers rather than building sites. Offshore a maze of forested islands provide a sheltered inner passage for coastal shipping, but few attractive spots for permanent settlement. In widely-scattered locations, however, fishing villages, logging camps, and huge pulp-mills make small, strictly-local impressions on the land. Near the mouth of the Skeena River, which makes a gap in the coastal mountains, there are several Indian villages, a few salmon canneries and two towns: Kitimat and Prince Rupert.

3. Less well known than Kitimat, the new town designed by Clarence Stein for the Aluminum Company of Canada in 1951, is the story of Prince Rupert, its nearest neighbour although the two towns are separated by 100 miles. Prince Rupert is forty years older than Kitimat, but like the latter it was also a carefully-planned new town, and one which was expected to become a major city of more than 100,000 people. Unfortunately, as so often happens, the expectations of the planners and developers were frustrated by events outside their understanding and control. The result is that Prince Rupert today, with a population of only 11,000 is burdened with a physical layout designed for a city ten times as big, and one which is in many respects quite unsuited to the local topography and climate. A brief account of the history of this remarkable town may be of interest in view of the concern with the building of new towns today.

4. Boom and Bust City. The building of Prince Rupert started in 1909 when the Grand Trunk Pacific Railroad (now the Canadian National Railroad) reached the Pacific coast. As the terminus of this new transcontinental railway the city seemed assured of a prosperous future, and few people doubted the extravagant claims put out by the sponsors of the under-taking. Unfortunately, the land of the northern interior served by the new railway proved to be only marginal for farming, and its mineral and timber resources are only now being exploited. In addition, the trade with the Far East and Alaska, which was expected to move through the first-class harbour, never materialized. However, the limitations of the site and the region did not become obvious until the mid 20s and the early years were characterized by an extraordinary amount of speculation which caused a fantastic boom in land values. This has affected the land-use pattern in several ways. For example, the wide, impressive avenue which was intended to be the main commercial centre has

Prince Rupert in its setting—rain clouds, mountains, forest, and sprawl.

A. D. Crerar

J. R. Wrathall

The Town Centre, Prince Rupert—a symbol of prestige for a great city; a source of problems for a small town.

remained largely undeveloped. Shops, cinemas, and offices were built on cheaper land along a considerably narrower street with no rear access on one side, and the city has now to solve a major traffic problem in this area.

5. When the boom finally burst in the early 30s, speculators all over the world who had invested in Prince Rupert lost a great deal of money. Many of them could not, or at any rate did not, pay their local taxes, and so large areas of over-valued land reverted to the municipal government. However, the heavy costs of servicing a city laid out in the grand manner did not fall to the same extent as revenue did, and the strain on the city's limited financial resources was too great to be endured indefinitely. In 1933 the city became bankrupt, and a receiver was appointed by the Provincial Government to administer local affairs.

6. The City Beautiful. The layout plan for Prince Rupert was prepared by Brett and Hall of Boston, Massachusetts, a firm of landscape architects. The planners were presented with the sponsors' estimates concerning the future size and extent of the city and were expected to prepare a design which would give it the scale, majesty, and form of San Francisco and other Pacific ports. In order to achieve this the planners had to give up any idea they may have had of building a city specially suited to the rugged topography of rock and muskeg bog, and an annual rainfall of 96 inches.

7. The site chosen for the new city was a relatively flat, narrow strip of land on one side of a magnificent natural harbour. There were no maps available, and as the land was covered by dense coniferous forest the planners had a very difficult time in their field work. However, they succeeded in adapting a system of long, straight avenues to the general form of the site in order to create what might have become a large and impressive commercial centre. In other areas streets were laid out more or less in sympathy with the contours in an involved "can of worms" pattern which was expected to attract high-class residential development. The master plan for the central part of the city covered an area of approximately 10 square miles, and in addition, extensive suburbs were to cover nearly all the buildable land on the neighbouring islands. However, the full extent of the present built-up area is only about 4 square miles, and the outlying areas are inhabited, if at all, by a mere handful of squatters and Indians. There have never been enough people to occupy fully even the central part of the site. The few thousand people who have settled in the city have spread themselves along a narrow strip of land five miles long by about half a mile wide overlooking the harbour. In doing this they have followed the pattern of long straight avenues laid down by the original plan. But the tendency to sprawl was further encouraged by the authorities selling off much more land then was needed to accommodate the actual rate of growth.

8. Unfortunately, Prince Rupert is one place where sprawl should clearly have been avoided. The natural inheritance of rock, muskeg, and rain obviously required concentrated development for economy in providing services and transportation, and also to create some measure of sheltered enclosure against the elements. However, it was

believed that a great city must have long, wide streets and formal squares and gardens, and so the storms roar unimpeded along the avenues, and the city gardener has to wage a constant struggle to prevent his lawns sinking into the muskey that underlies the imported top-soil.

9. Future Prospects. The example of Prince Rupert should stand as a reminder to planners of new towns that, long after they have left to conquer fresh fields, the administrators and citizens will be living with the mistakes (and benefits) of the master plan. In the case of Prince Rupert, the municipal finances will never be free from the burden of costs occasioned by the ruggedness of the site, the misconceptions in the design, and the lack of adequate staging of development.

10. The Pursuit of Greater Compactness. Although today there are signs of new growth with the development of timber and mineral resources and air transportation, it is very unlikely that Prince Rupert will ever become a large city. Even if it did, considerable changes would have to be made to the original master plan to meet modern requirements. It is obvious that Prince Rupert needs a more compact form. This would lighten the strain on the municipal budget by reducing the length and width of roads and the cost of services. It would also reduce the distance to be travelled between one part of the town and another, and provide shelter against the elements.

11. Compactness can be pursued in two ways. Firstly, by restricting development in new areas, as long as space is available "closer in." Controls of this nature are not difficult to enforce in Prince Rupert, where much of the outlying land remains in the ownership of the council. Secondly, by tight zoning of the commercial area to encourage development in depth as an alternative to the further extension of a long ribbon of commerce. Parking space for a compact commercial centre could be provided by stopping-up several short streets which are not needed for through traffic. Concentration should also be the aim in new civic building. The nucleus of a civic centre already exists in the majestic garden square which was carefully placed at the end of the main avenue, but this space needs more enclosure and a reduction in area.

12. With minor modifications such as these the physical form of Prince Rupert could be adapted to provide more adequately for the real needs of the town. These have been ignored in the pursuit of a vision which was dreamed up by speculators and embodied, in perpetuity, in the master plan.

Erskine, Ralph
BUILDING IN THE ARCTIC
"Architectural Design," May 1960. Pages 194-197. Illustrations.
69.03 (98) (485)

1. Ralph Erskine, an Englishman working in Sweden, has summarized many of the criteria necessary for satisfactory human habitation in the far north. Similar criteria have been evolved for the design of towns in other parts of the arctic. See EKISTICS HIB-GA 48 (October 1959), pp. 245-252 and HIB-GA 40 (February 1959), pp. 143-144.

2. The arctic, a sea surrounded by land, can be divided into two zones: the arctic zone proper, consisting of polar sea and the partly glaciated islands, like Greenland, where snow and ice never disappear; and the sub-arctic zone, a great circumpolar region stretching from the polar sea to well south of the tree line where it merges into the cold temperate zone.

3. The sub-arctic is growing rapidly in importance. Below the tundra lie deposits of iron, nickel, copper, lead, gold, radium, asbestos and oil, whilst above it fly the new polar airways. Added to this, it has become one of the most important strategic areas. These new activities are introducing more and more permanent settlers to the zone. They move from populous areas to small towns in an isolated land and expect those amenities they previously enjoyed. Towns cannot borrow from neighbouring cities, but must be self-sufficient in every sphere. Usually when settlers move to a new country they attempt to recreate their old homes. In the sub-arctic this can never be successful, and modern man, like the Eskimo before him, must use his resources to arrive, by analysis and synthesis, at an indigenous culture.

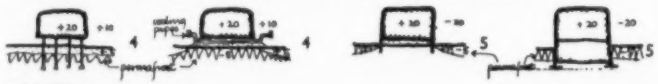
4. The essentials of this human and physical situation make necessary the realization of the violence and the drama of contrasts and a restatement of the protective function of buildings and towns.

a. The warmth, the brilliant light and the teeming life of summer; the cold, dark sterility of winter; each creates a protection need.

b. The consequent changes in human spirits and the rhythmic changes in social life, from the extrovert of summer to the introvert of winter.

c. The geographical isolation in an extensive and often wild nature and the resultant impact of a human milieu. Wild nature is ubiquitous and the human is the exception (the opposite of the 'man-made' world of the temperate zone): everything man-made needs protection and intensification.

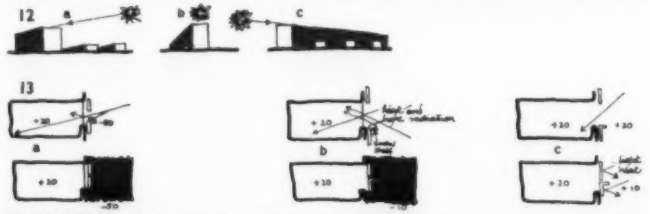
HEAT LOSSES 1 *heat loss through large surface area* 2 *structural protection. It is important not to break the enclosing envelope unnecessarily* 3 *structural separation*



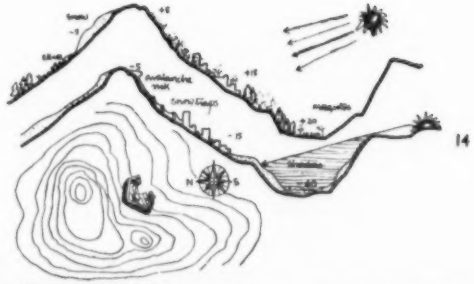
FROST 5 *winter* 4 *summer*

WIND 6 *in spring and summer (and even winter) sun or artificial radiation give comfort if protection is offered for even slight air movement* 7 *sun radiation and protection from air movement in cold climates, but air movement keeps mosquitos away* 8 *use of air breaks to slow movement over main façade* 9 *Swedish barn and, below, its application for snow clearance*

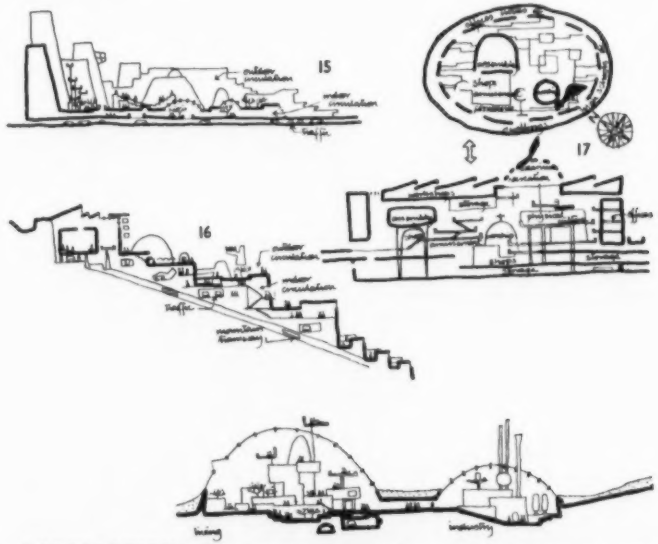
VEGETATION 10 *3–4 storeys not in scale and not suitable* 11 *buildings in scale with the low vegetation or with an extensive or mountainous landscape— the monumental situation of man*



SUNLIGHT 12 **a** *winter* **b** *summer day* **c** *summer night* 13 *the need for a variable window: examples day and night* **a** *winter* **b** *equinoxes* **c** *summer*



MICROCLIMATE 14 *due to low angle of sun radiation, microclimate is of utmost importance. Sketch shows siting with protection against midnight sun, wind, snowdrift, extreme temperatures, shadowing and mosquitos. A sloping site gives more intensive radiation, a view over nature and lack of north elevations*



AGGREGATION *varying functions move together for mutual protection* 15 *flat site* 16 *sloping site* 17 *grouping of various functions with motor and mechanical transport at lowest level and open and protected pedestrian levels above*

d. The contrasts between the experience 'indoors' and the experience 'outdoors' during the larger part of the year: more than anywhere else the enclosing envelope becomes a separator, with the existence of space continuity as a relatively indirect experience.

5. The traditional 'Frontier Town.'

a. Isolation and extreme conditions create tensions.

b. Personal relationships are especially important and often difficult.

c. The frontiersman and hunter type who is attracted to the communities, is not a good town dweller.

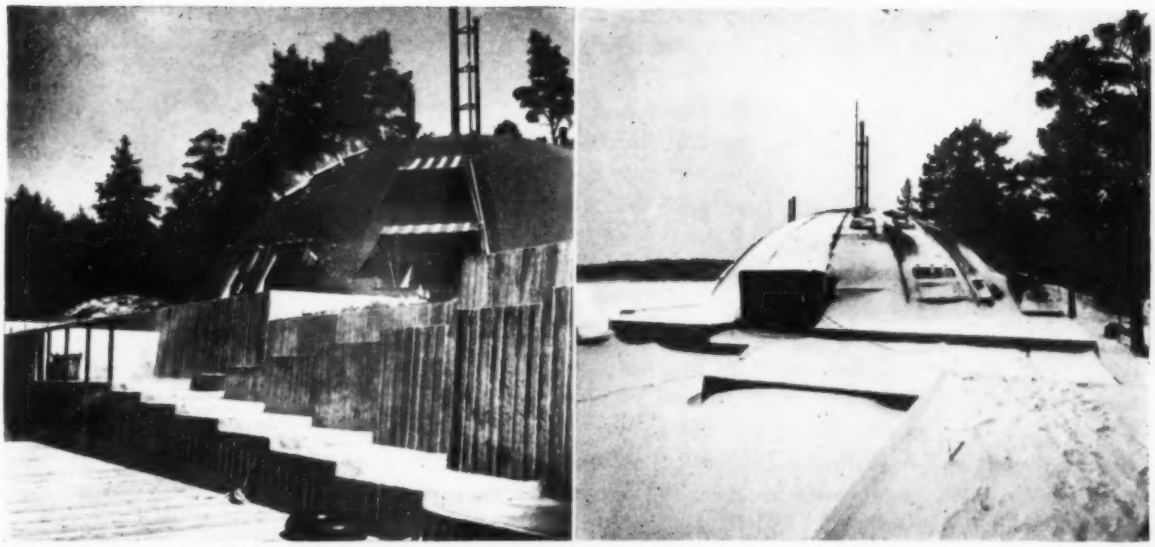
d. Communities tend to be of frontier type with a population flux, and are neither functionally, nor humanly satisfying.

e. This situation tends to lead to imitations of 'home country' conditions.

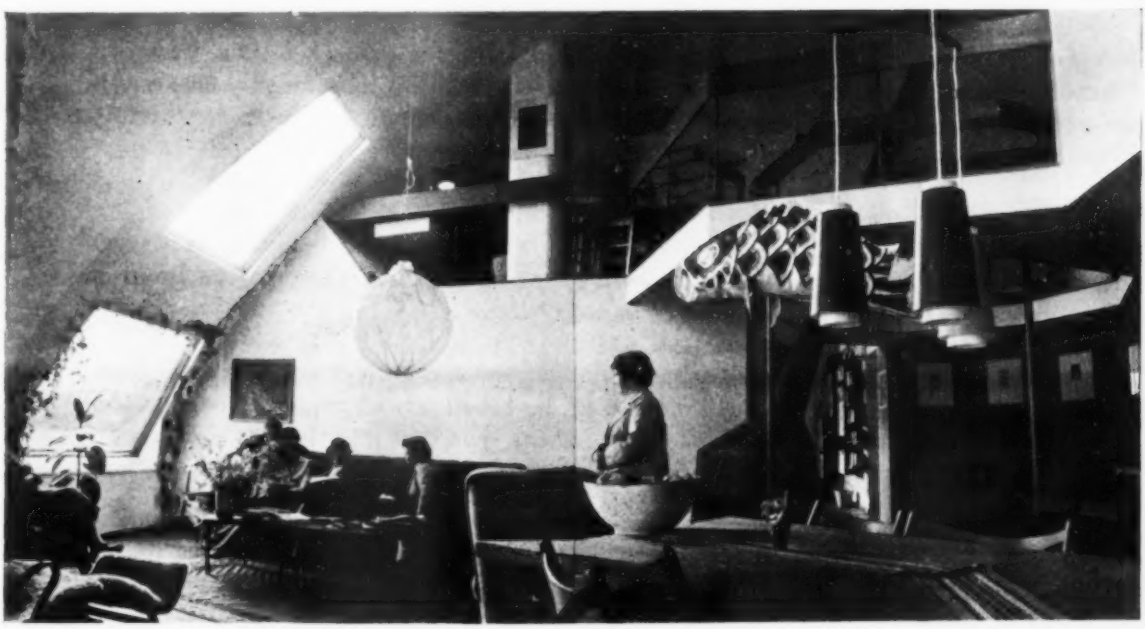
f. Such limitations are always inferior to the original, and emotionally and culturally unsatisfying.

6. The New Towns. Northern towns must become free of the 'colonial' attitude and base their own culture on their own way of life. They should, due to their isolation, be made more attractive and genuine than their equivalent in more southerly latitudes. They should be intensive communities with possibilities for varied activities, since neighbour towns are distant. They should cluster to form a human milieu in the desert: the green town belongs to regions where vegetation is friendly, where the stone town appears hostile. Here nature is dominant and everything 'human' the exception, which needs to be intensified and protected. Within the human milieu there should be formal planting with exotic vegetation--such as apple trees. From it there should be views over the surrounding landscape, as there will be many indoor workers. There should be well-heated and lighted communications, piazzas and gardens, covered for bad weather, but able to be open in good weather. They should be planned to offer easy human contacts, but also personal freedom and privacy. Even more than others they should be based on technical rationalization and standardization, as building costs are enormous; but such standardization should offer a maximum of human choice--rational or irrational.

7. It is possible to widen the grammar of sub-arctic life, but to sustain the threads of contact with the south. The sub-arctic dweller should not become even more isolated by an over-emphasis of the exceptional of his existence. The changes in the structure of his town and society should help him to live with instead of against his environment. It should become easier for him to find satisfaction.



Experimental villa at Liso which incorporates much of the theory of Arctic building described on the previous pages. At left, summer and (right) winter aspects



Vagale, L. R., Bhuta, B. M., Rao, M.S.V.
FARIDABAD--A CRITICAL STUDY OF THE NEW TOWN
Urban and Rural Planning Thought, Vol. II, No. 3, July 1959. Pages 84-108.
711.41 (540)

1. At the request of the Institute of Town Planners, India, a critical study of the Faridabad New Town was undertaken by the staff of the School of Town and Country Planning. This critique, in contrast to the one of Chandrigarh undertaken by a student group at the University of Pennsylvania and abstracted in the August EKISTICS, deals specifically with the Faridabad plan and how it has developed.

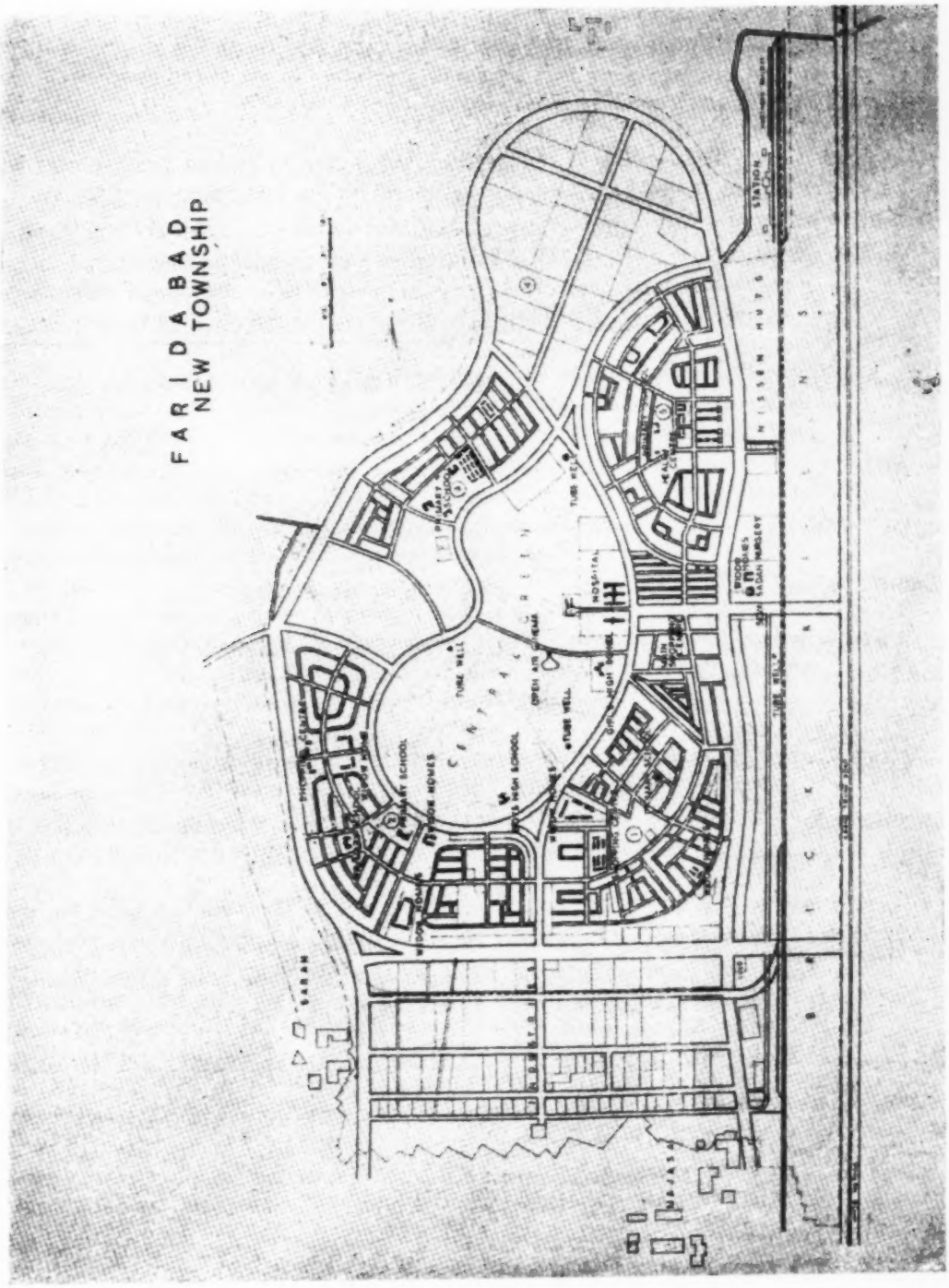
2. Location and Planning. The Faridabad Industrial Township is located on Delhi-Agra National Highway and on the Delhi-Bombay Railway line, at a distance of about 17 miles from Delhi. The Township extends over an area of about 7 square miles and was designed to accommodate nearly 50,000 persons, when fully developed. The site is more or less flat except for a slight mound in the middle, which has been made the centre of the layout to form a 'Central Green.' The 'Central Green' will accommodate public buildings, parks and playgrounds.

3. The project was sponsored by the Faridabad Development Board constituted by the Government of India. Shri P. L. Varma was the Town Planner and Dr. O. H. Koenigsberger, who was then Housing Adviser to the Government of India in the Ministry of Health, was the Consultant. The layout was prepared in the year 1949 and construction of the township was taken in hand by the Punjab Public Works Department towards the end of 1949. In the middle of 1950 it was handed over to the Development Board, and a major portion of the construction and rehabilitation work was completed by March 1952. The Indian Co-operative Union extensively aided in the promotion of the project and in the rehabilitation of the displaced persons.

4. The township consists of five neighbourhood units arranged around the 'Central Green.' Four out of the five have been completed so far. Each is roughly half a mile by one mile and is meant to accommodate about 10,000 people. Each has two basic schools, a shopping centre, a health centre and open spaces.

5. Immediately south of the town is an industrial area of about 348 acres in extent, with a railway siding of 3.6 miles length running through it. The industrial sector was expected to attract new industries which were seeking location in and around Delhi and also industries which were willing to move out of Delhi.

6. One of the important features of Faridabad township project was that more than 90 per cent of the manual work was carried out by previously untrained refugees, who were small merchants and petty shopkeepers, of the type that traditionally despises manual labour. During the first year of construction, the Development Board executed


FARIDABAD
NEW TOWNSHIP

the work departmentally and the refugees received doles at flat rates. To aid the self-help building efforts, ten brick kilns were started, with fifty families joining to form a producers' co-operative for each kiln. During the second year of construction the refugees worked on a subsidised co-operative basis, that is, the wages normally paid to the unskilled and skilled workers were subsidised. The subsidy on the wages was as much as 150 per cent in the beginning being gradually reduced to nil as the apprentice-workers mastered their skills and earned normal wages.

7. Land Uses. The total area of land acquired by the Faridabad Development Board in the year 1948 was 2,465 acres, of which about 51% has been developed so far. Specific analysis follows:

Land Use	Area in Acres	% of Total	Remarks
Residential	1,220	49%	319 acres of this have not yet been developed.
Industrial	348	14%	A very small portion undeveloped.
Major Shopping	23	1%	Not yet developed.
'Central Green'	305	13%	Partly developed.
Land between Railway and National Highway	200	8%	At present occupied by brick kilns.
Land between peripheral road and railway line	120	5%	Partly developed.
Land occupied by outfall drains	249		Could be developed for other uses after drainage scheme is implemented.

NOTE: The area stated under each land use includes roads and streets. The total area covered by them is about 345 acres or 14% of the total area of township, approximately 28% of the developed land.

8. Residential Area. The residential area is divided into five neighbourhood units, of which No. 3 has 83 acres of land left undeveloped and No. 4, covering an area of 236 acres, is completely undeveloped. About 40% of the area of each neighbourhood unit is devoted to residential use. The net densities vary in each unit from 18 houses, or approximately 130 persons per acre, to 21 houses, or nearly 150 persons per acre. The overall density, including the industrial land, is 5 houses or about 30-35 persons per acre.

9. Each neighbourhood unit has shops and basic schools located in the centre. In all about 200 shops (each shop measuring 10' x 10' with verandah 10' x 4') and about 96 stalls (6' x 6') have been built by the Development Board. They occupy about 7 acres of land. Besides these, there are unauthorised shopping shacks scattered all over the neighbourhood units. An area of about 23 acres in the neighbourhood unit No. 1 designated for the main shopping centre is yet to be developed.

10. Industries. Faridabad is said to have been designed to serve as an industrial township. The planners claim that consideration of prevailing winds, the availability of non-arable land and road and rail access led to the establishment of the 348 acre industrial zone to the south of the township. It was anticipated that about 6,000 persons would find employment there. However, up to 1954, the industrial development had not taken place on the scale anticipated. Since 1954, the scene has changed. Several industries have been established and are flourishing.

11. Presently, there are nearly 50 private industries employing 6,000 persons. Of these about 46% are skilled workers. It is estimated that nearly 52% of the workers are registered displaced persons, while unregistered refugees, local workers and others constitute the remaining 48%. There are only 150 female workers (2.5% of total).

12. Faridabad has varied types of industries, the major ones being manufacture of electronic equipment, electrical goods, leather goods, rubber products, implements and tools, automobile spares, plastics and ceramics. About twenty factories employ more than 100 persons each, and three employ more than 500 persons each.

13. Industrial Housing. Nearly 60% of the industrial workers, who are registered displaced persons and whose income is below Rs. 300/- per month (approximately $63.00), are living in quarters allotted by the Development Board. Another 15% who are not registered displaced persons live in quarters built by the Development Board but allotted to the factories. About 10% come under a high income group and live in better houses built by the Development Board and allotted to the factory owners. The remaining 15% either live in private buildings or commute to Faridabad from other places like Delhi, Ballabhgarh and Gurgaon.

14. Housing. There are altogether 5,128 refugee houses, 74 Nissen huts, 74 bungalows and flats, and 8 homes for widows (consisting of 589 rooms). The flats

and bungalows have been built for high income groups and are situated in neighbourhood units No. 1 and 2.

15. A majority of the houses are of a standard pattern of semi-detached type. Ninety-seven per cent of all the houses are pucca (e.g., of permanent construction), having brick plinths, plastered brick walls and flat roofs, constructed of reinforced concrete pre-cast beams or wooden joists with cement or brick tiles. However, 20% are semi-pucca, with brick-plinths, and walls and roofs of corrugated iron sheets. There are many temporary and unauthorized sheds and tents all over the town. The dwellings originally constructed consisted of 2 rooms and an attached kitchen with a total floor area of 300 sq. ft. However conditions changed subsequently. A housing survey conducted in 1954 revealed that about 19% of the houses had a covered area of 100 to 300 sq. ft. with only one room, 75% had a covered area of 300 to 600 sq. ft. with 2 rooms and the remaining 6% had a covered area of 600 sq. ft. with 3 to 4 rooms. Since 1954 more unauthorised additions and alterations have been made to most of the dwellings.

16. Out of the 5,158 refugee houses nearly 21% are let out on a monthly rent of about Rs. 12 (approximately $4.30) and the remaining 79% are sold on a hire-purchase basis on monthly instalments of about Rs. 12 over a period of 30 years. The survey carried out in 1954 revealed that about 82% of the families enjoyed exclusive occupation of dwellings and about 18% shared with other families. However, for the past five years there has been a considerable increase in the number of families sharing their dwellings. At present it is estimated that the average household consists of 6 persons and that nearly 40% have more than 6.

17. Amenities. Faridabad does not have any recreational facilities excepting an open air theatre, where occasionally dramatic performances, cinema shows and cultural functions are held. The Badkhal reservoir, situated on the western side of the township, has been partly developed for recreation. If fully developed, it could serve as a major recreational centre for the township. Negotiations are being held by the local administration with the Forest Department of the Punjab Government for planting trees and shrubs in the central open space so that it can serve as a central park and recreation ground.

18. The township has a well-developed system of health services. The main hospital situated in the 'Central Green' has a surgical block, radiological block, wards with 150 beds and a family planning unit, with 6 doctors and 11 nurses.

19. Faridabad has adequate educational facilities. Nearly 5,500 boys and girls receive education in 10 senior basic schools. In addition, there are 2 high schools--one for 800 boys and one for 500 girls. Recently another post-basic school has been added accommodating 300. The schools are adequately staffed with a student-teacher ratio of 40:1.

Unauthorized constructions which have sprung up all over Faridabad.

A Part of the Industrial Sector—Faridabad.

CRITICAL EVALUATION OF THE TOWNSHIP

20. Location and Siting

a. The location and selection of site leave much to be desired. The town is only ten miles from the municipal limits of Delhi, which is sprawling in a disorderly manner. It is feared that in another ten to fifteen years the suburbs of Delhi are likely to touch the fringes of Faridabad. It will be another suburb of Delhi instead of a self-contained industrial township. It should have been located further away from Delhi so that it could retain its identity and character.

b. The site selected is not too satisfactory as the terrain is hilly on the west, low on the southern side and very poorly drained all over.

c. It is learnt that a lot of confusion and inconvenience is being experienced as the new town and existing old town have similar names.

d. There has been no attempt to integrate the new with the old town.

21. Population and Employment. Children under fourteen years constitute 42% of the total. The ultimate result of this will be lowering the living standards, as earning members find it increasingly difficult to support extra dependants. Unless steps are taken to provide employment to a large number of persons who are crossing the age of 15, the outward migration of young persons is bound to occur. It is estimated that every year at least 1,000 persons will have to be provided with employment.

22. Land Use.

a. The area assigned to roads and streets is excessive: 28% of the developed land.

b. The extensive 'Central Green' intended to serve as a recreation ground has not been developed so far. Though it offers great scope for developing and landscaping, at present it is a big dust bowl.

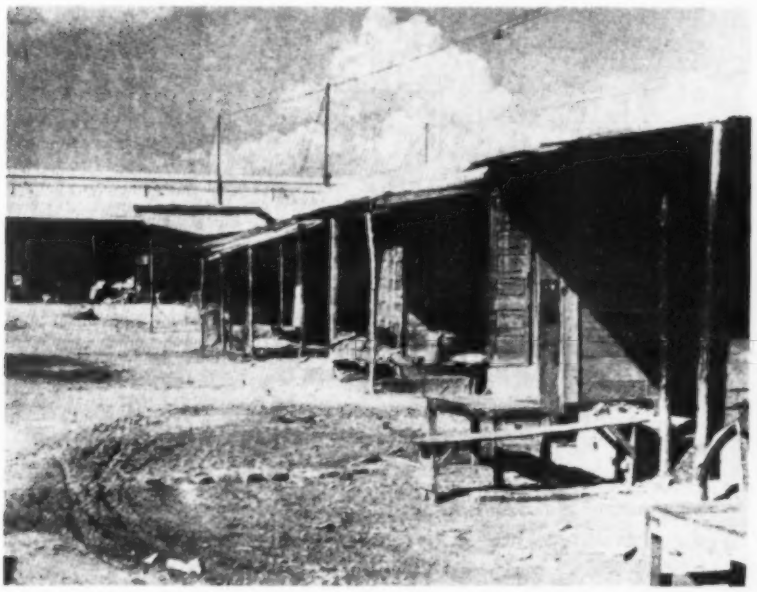
c. Some housing is taking place in the village 'Saran' situated on the south-west of the industrial sector. This land is low lying, liable to flood, and detrimental to health. It makes the growth of industries difficult at a later stage.

d. 10% of the total land is occupied by the outfall drain. If drainage is improved, a major portion of this can be reclaimed and put to better land uses.

e. Due to lack of enforcement of building regulation, unauthorised constructions and ribbon development are taking place in many parts of the neighborhoods, and especially along the road connecting the township and railway station.

f. It is learnt that there is a proposal to develop Neighbourhood 4 for small-scale industries. This is rather undesirable as the traffic between this area

Wooden sheds have been put up even in those areas where shops have been built.



The Central Green.—It has not been developed and is being used as a grazing ground.

and the main industrial sector is likely to pass through other neighbourhoods. In view of rapid increase and the shortage of accommodation, it would be better to develop No. 4 as originally planned.

23. Industries.

a. The present location is not too satisfactory. The town is sprawling over a distance of nearly 3.5 miles. The movement of people from the various neighbourhoods to the industrial sector is one of the major problems. There is no internal transport system; even if one were to be provided, a majority of the industrial workers cannot afford to pay for it. Most of the employees walk, while some cycle.

b. There has been no attempt to evolve a planned industrial sector. Very little attention seems to have been paid to the economic base of the town and its employment potentialities. Within 10 years, the industrial area has become insufficient; utilities and services are inadequate; housing accommodation is scarce, and commuting distances long.

c. Due to lack of facilities for locating new industries, many have sprung up along the National Highway between Faridabad and New Delhi, causing ribbon development.

d. Faridabad can take more industries.

e. Banking and credit facilities available to industrialists are grossly inadequate.

f. At present quarters for the employees of the Government Printing Press are being constructed on the south side of the industrial area making further extension of industries difficult.

g. Due to lack of efficient under-ground drainage and lack of enforcement of rules regarding disposal of wastes, industrial effluents are being discharged into the drains causing odours and other nuisances.

24. Transportation.

a. The railway siding and goods-shed facilities are not adequate.

b. There is no good approach road to the goods-siding.

25. Utilities.

a. Storm water drainage is perhaps the greatest problem. Roads and streets are flooded during monsoons, as many sections do not have any drains. Where they have been provided, the longitudinal slope is inadequate. In many sections drains are choked up by house-refuse and have become veritable hot beds for breeding of mosquitos.

b. The present bore-hole latrine system is very unhygienic and primitive. Further, many have been replaced by chula type and the effluent is being discharged into open storm drains. Well over 10% of the population has no use of latrines.

26. Social Aspects.

a. By resettling a concentration of displaced people from a single province, speaking the same language, having the same background, the planners missed an opportunity of evolving a balanced and mixed community.

b. The displaced persons, by and large, continue to live in a rural and unhygienic environment in the midst of the new industrial town.

c. Civic sense is reported to be rather poor as the inhabitants came from a comparatively under-developed province.

d. Though there are an adequate number of shops, they are ill-kept. Too many unauthorised shops have sprung up blocking the frontage of regular shops and marring the appearance of the areas.

27. Housing.

a. As all the refugee-houses are of a standard pattern (semi-detached type) they are monotonous. Besides this, they do not cater to the requirements of varied family sizes and incomes.

b. Construction of the dwellings is rather bad and maintenance worse.

c. In the original scheme, no provision was made for accommodating supervisory and managerial staff having high income, as they were non-displaced persons. This has entailed considerable travelling time and expenditure.

28. Administration. There are difficulties in transferring the administration of the township from the Development Board to the Government of Punjab. With this, it is likely that the new industrial township will become equal with other small towns of the State and that the impetus to its development will be prematurely lost. In the interest of administration and orderly growth it is necessary to extend the activity of the Development Board.

CONCLUSION

29. There is no single criterion by which the new town can be judged. Success or failure in rehabilitating the displaced persons is one measure; role in decentralising the metropolitan city of Delhi is another; performance in planning, designing and building the township is a third one; the development cost is yet another criterion. Perhaps the most important of all the diverse ideas is the impact of the new town on planning, the deeper trends it exemplifies, its positive or negative contributions, and the role such new towns may play in future. The importance of a new town like Faridabad also lies partly in the ideas it reflects as well as the principles it suggests.

Dobush, Peter, Parkin, John C., and Pratt, C. E.
REPORT OF THE COMMITTEE OF INQUIRY INTO THE DESIGN OF THE RESIDENTIAL ENVIRONMENT OF THE ROYAL ARCHITECTURAL INSTITUTE OF CANADA, 1960.
Royal Architectural Institute of Canada Journal, May 1960. Pages 175-229. Illustrations.
711.58 (71)

1. Under direction from the Council of the Royal Architectural Institute of Canada, Peter Dobush was appointed chairman and John C. Parkin and C. E. Pratt permanent members of a committee to make a detailed enquiry into residential growth and development in Canada. They spent many weeks of travel in which they were assisted by local members of the Institute in arriving at this report.

2. Terms of Reference. It is now clear that the most prominent aspect of the current development of Canada is the growth of her cities and that these will double in extent in less than a generation. Four-fifths of this new city extension will consist of residential districts, which is to say that there must soon be devised for millions of Canadians a living environment equal in area to all existing urban surroundings.

3. Accordingly, the Royal Architectural Institute of Canada sets out for its Committee the following terms of reference to guide their investigation: to make a study of the design of the residential environment in Canada and to find out how the architectural profession can contribute more effectively to the improvement of the quality of the design and layout of residential areas. To that end to inquire into:

a. The objectives to be sought in the design and layout of the total residential environment.
b. What factors at present shape the residential environment; what factors at present encourage, what factors discourage the achievement of these objectives; what can be done to modify these factors.
c. The ways in which these objectives may be more fully realized, with particular reference to the ways in which the architectural profession can contribute more effectively to their realization.

4. Objective: Freedom by Design. Old and young people in our cities are housed in all sorts of groups: single persons, families large and small. They encounter changing conditions: of employment and income, of ties of kinship. They display a wealth of different attitudes: to education, leisure, housekeeping, community interests and obligations. All these factors enter into the choice of a district appropriate for their residence, and the suitable form of dwelling within that district, at each phase of their life as a household. There are hundreds of possible combinations of these factors. No repetitive pattern of housing development can be expected to meet even a good part of the residents' proper choices through the years.

5. To correspond with the variety of households, there must be a wide range of dwelling types. They vary by number of rooms, their sizes and arrangement, the housekeeping effort expected of the occupants or provided by others, the structural linkage of one dwelling unit with another, terms of possession by rent or purchase, the amount and kinds of outdoor space for the use of the household. Dozens of these variations of type can be found in any small town. Only a very few types are to be found in new Canadian metropolitan housing projects. Some types of dwelling, for instance the apartment with a minimum kitchen, depend on neighbourhood facilities like clubs and delicatessens to supplement what they offer. A few types of house are too rarely asked for to be financed by great lending institutions or produced by modern large-scale technology. But richer mixtures of dwelling type should be possible than we have been getting.

6. The Committee therefore recommends systematic and continuing investigation and measurement, by specialists with suitable qualifications, of the divergent needs and preferences of Canadian households; these should be examined according to their compositions, backgrounds, region of settlement, and whatever other factors may genuinely warrant expression in dwelling design, group siting and provision of internal or external facilities.

7. The Committee adopts three related general objectives for future housing:

a. That everything possible should be done to maintain that volume of housebuilding that every informed forecast indicates the nation will need in the years just ahead.
b. That every possible measure should be taken to encourage diversity among these new dwellings in size and nature, and mixture of several types in each new urban area, matching the variety of households in the local scene.
c. That full encouragement should be given to the careful design and execution of every part of this new housing, to the end that its prevailing excellence by 1967 shall reach the level of the recognized best of ten years earlier.

8. Present Processes. We have named three essential dimensions for solid accomplishment in Canada's future residential environment. We turn now to the factors that diminish or extend each dimension.

9. The Committee draws the attention of municipalities to the Federal-Provincial land assembly provisions, which in addition to yielding development land at lower cost, offer advantages for the better design and diversification of the housing built on the land.

10. The Committee urges the most energetic action by appropriate departments of Provincial and Federal governments, to identify areas of irreplaceable agricultural value that are threatened by imminent urbanization, and to protect those areas of unique value for future generations.

11. The committee welcomes the information that municipal site design codes are under study at the University of British Columbia and:

a. urges collaboration with this study in other parts of the country;
b. recommends incorporation of the logical principles emerging from such studies into the development codes of provinces and cities.

12. The Committee recommends that the various public bodies setting power and telephone rates be pressed to undertake a concerted study to compare the costs per year of use of underground and overhead distribution systems in the various conditions that prevail in Canadian urban centres, and to publish the results.

13. The Committee urges that Central Mortgage and Housing Corporation and the private residential appraisers should review their present formulae, to give more inducement to build quality into the huge amounts of housing in prospect.

14. The Committee recommends that deliberate use be made of the National Housing Act to encourage variety in dwelling types and combinations. Anticipating that this change of emphasis might reduce output for a little time, it could be introduced when national fiscal policy requires a temporary slowing of housing investment. Diversity in housing programs is more likely to be achieved by large firms having extensive lands and substantial funds at stake.

15. The Committee recommends that the sponsors of design awards to all in their power to make illustrations of the recognized best readily available do editors and producers of mass media. The architectural profession, being owners of many of the designs and photographs, participants in many of the award projects, and subscribers to the professional press, is particularly urged to contribute to this end.

16. The Committee commends the selections of the National Industrial Design Council in street furniture, and urges that Council to prepare an illustrated catalogue to the best items for the guidance of municipal and utility authorities.

17. On the Whole Cost of Housing. The Committee recommends that Central Mortgage and Housing Corporation be urged to undertake a thorough survey from the information available to it, of the operating costs of housing in the regions of Canada, as affected by its layout, design and construction; and to publish the results in forms useful to designers, sponsors and administrators in housing.

18. The Committee recommends that steps be taken to use the National Housing Act and institutional funds to build pilot projects for varying climates and cultures, employing in part that unfamiliar yet promising species of dwelling that is neither a detached house nor an apartment building;

a. that these blends of dwelling types be given close operational study in use as to their running costs, including tax levies appropriate to whatever municipal economies these new forms achieve;
b. that some of these pilot projects should be in redevelopment areas;
c. that the data so gained be published for the information of housing designers and authorities, municipalities and the interested public.

19. Observed Conditions for Good Housing Design. Nearly every city we were able to visit contains areas of well laid out, well designed modern housing. Each good project had its particular character. Only those who have been active in each scheme could fully account for its merits. But certain circumstances attended so many of the notable examples that they can be listed as conditions favourable to design of a good housing environment. These conditions are:

a. an extensive parcel of land in the developer's control;
b. this owner's interest in the land maintained over some years;
c. appointment by the owner of a competent design team;
d. contact between owner and design team throughout development;
e. respect for the inherent natural qualities of the site;
f. room in the original design for future adjustment of detail;
g. official scrutiny of the design on its merits by qualified men;
h. an ample and reliable flow of credit for fulfillment;
i. suitable links and protections for this housing area in the publicly endorsed plan and program for the urban region.

20. The Urban Framework for Residential Environment. As our cities grow, more and more housing will lie in the paths of travellers whose origins and destinations will be in other areas out beyond, or downtown in the working centre. These strangers will move in thousands of vehicles, and be too intent on safe travel to give themselves to visual delights. They will want more tons of cables, conduits, and arteries strung out to them every year. The roads and facilities they need will be unsafe, unsightly and out of keeping with any attractive dwelling districts they traverse. These channels of movement call for design at the metropolitan scale. Given a well-conceived series of neighbourhoods, the grand chart of the city is the only way to protect those areas in use over the years. For good residential environment, the one scale of design is as necessary as the other.

21. Good residential building depends on strong urban government over the urbanizing area, an urban government that has determined the main shapes and channels future growth. This requirement raises large questions of local authority unification and administrative structure; of municipal powers, revenues and credits equal to the task; and of the recruiting of a corps of professional personnel adequate to the city's obligations to its future. Some of these needs are discussed in this report; others fall outside its scope. Sufficiency on all these counts is plainly necessary to the realization of good residential environments.

22. Professionals in this Design Process. The Committee is convinced that the architectural profession should have reference to a more systematic and independent literature and a growing body of knowledge, dealing with human behaviour in and about dwellings as a function of their design. The profession should be able to establish more clearly the specific gains and losses to occupants entailed in design alternatives, not only in dollars but in bother over the years. To this end the Royal Institute is asked to promote behavioral and economic studies of the residential environment, and to encourage the introduction of more such material into the curricula of the schools of architecture.

23. The Committee urges present undergraduates and recent graduates in architecture to consider this field for their careers. They should seek opportunities for systematic study and practical experience in the commercial building of residential accommodation. They should travel to know at first hand the prototype housing solutions that are appearing in every urban society. A number of fellowships, scholarships and bursaries are available for such purposes, more than have been taken up in recent years. It is for younger members of the profession by their application to these problems to prove the need for more study grants.

24. The Committee recommends that the Royal Institute give its support to the establishment of a professional school or schools of landscape design in Canada; and that in view of the nature of future residential areas, such schools should offer training in earth-moving, drainage and road technique, in addition to horticulture, arboriculture and principles of design.

25. Governments in this Design Process. We have argued that a major project in residential development cannot fairly be judged by written codes, but should be looked at on its own merits. It follows that approving authorities must have advisers able to comprehend the quality of the whole design. History has made Canadian residential construction quasi-public business. Its typical products will bear the stamp of quality only when every local public office through which they pass brings ideals of quality to bear on them.

26. The Committee recommends that each approving authority require the applicant to submit a full presentation of the appearance of his intended housing project; that

this presentation use drawings, models or photography to show the project in the existing setting; and that the authority establish a standing arrangement for commendation of this presentation by qualified persons and for inspection by affected owners of this presentation and advice, as a condition for granting approval.

27. The Committee sees the need for close study under Provincial auspices of the useful identification of density in housing, and the relative costs and benefits of housing development at various possible densities; this accounting should recognize the divergent social compositions of different residential areas and their varying dependence on throughfares, institutional and open spaces; the results should be published in terms of costs to the occupants and to the community over the useful life of the accommodation.

28. The Committee recommends a thorough study by the Provinces of the equitable impact on private property values of the exercise of necessary public regulation over kind and intensity of urban land use, the problem to be seen in the perspective of current rates of city growth and change.

29. The Committee recommends to Provincial highway departments and others interested in road transport that they undertake immediate studies of the impact of major roads on adjoining private properties. Such studies might include intergovernmental measures to save residents from road travellers, just as road travellers are protected from railway crossings. These studies should examine the possibilities in planting, in grouping buildings for occupants who will be absent when roads are busiest, and otherwise to ensure economy of urban structure from the several points of view involved.

30. The Committee recommends that health and recreation authorities, in association with other public and private bodies who serve this field of activity, should cause a thorough investigation to be made of the emerging uses and appropriate standards of area, distribution, and equipment relating to open space in urban residential districts.

31. The Committee recommends that the Provinces consider legislation, if necessary, to permit growing cities to acquire lands in advance of need for the common use of residents of future neighbourhoods; it being understood that the municipality could convey parts of the lands to non-profit institutions for completion of the environment.

32. The Committee therefore suggests for discussion by local Chapters of the Royal Architectural Institute of Canada, the Town Planning Institute of Canada and the Canadian Society of Landscape Architects, that they might together prepare a presentation study design for the public and institutional sites in each new neighbourhood or redevelopment area; such a design would be offered to the municipality as a professional contribution, after official needs are established and the public lands to meet them are identified.

33. The Committee recommends that those Provinces not now doing so should take specific steps to preserve good historic buildings, if necessary to find new uses for them, and to compensate their owners in whatever way is fairest in the circumstances; further, that redevelopment authorities and their architects make every effort to retain the values these old buildings represent for future citizens; and that architects study the techniques of the preservation of buildings and support the Institute's committee and voluntary bodies dedicated to keeping the best of our architectural inheritance.

34. The Committee is convinced that every municipality genuinely concerned for the living environments of its citizens will have vigorous and steady programs for removal of housing that cannot in all conscience be redeemed, and for the creation of public housing for those citizens who are for the time being less fortunate.

35. The Committee asks that the Provinces of Canada be urged in the strongest possible terms to launch energetically the economic analysis of those regions undergoing fastest urbanization and physical change, with a view to adopting, in consultation with Federal and municipal authorities and through public hearings, plans and programs setting out the main lines to be followed in the publicly initiated development of each such region. The adopted regional plan would also be for the guidance of municipalities in the exercise of their proper functions including those dealing with private property. Such plans and programs should be subject to periodic review in the same way they are first established.

36. Development of Urban Design Data. The Committee recommends to Central Mortgage and Housing Corporation, as the agency with a national mandate in housing and planning research, that it should convene a conference on the idea of a permanent Canadian Institute of Urban Studies. The Corporation need not, in so doing, commit itself in advance to this instrument. It should invite to the discussion the representatives of those governments, universities, national corporations and other research bodies that have already made significant contributions to urban studies in Canada.

Demarest, William
CHEMISTRY'S MAN-MADE PLASTICS
Progressive Architecture, June 1960. Pages 145-149. Illustrations.
691.175 (100)

1. Origins, definitions, and applications of plastics products in architecture, created through chemistry, are presented in this discussion by the Director, Plastics in Building, Manufacturing Chemists' Association. His principal intention is to demonstrate what plastics can be expected to perform, as well as what they cannot.

2. Plastics' Giant Molecules. Without plunging rashly into molecular theory, it will do no harm to the designer who wishes to understand his materials to discover that plastics are grouped by chemists with the "high polymers." The reader may have noted that many of their chemical names carry the prefix "poly-": polystyrene, polyvinyl chloride, and so on. "Poly-," for "many," indicates that the molecule of which the material consists is a giant one, a long chain of little molecules linked together repetitively. Ethylene is commonly known as a gas; polyethylene is today among the most familiar of our plastics--a solid. The great number of ethylene units that are linked to form a polyethylene molecule is indicated by the difference in the molecular weights of the two substances: ethylene's is 28; polyethylene's is typically about 20,000. Tangled, spaghetti-fashion, countless such molecules constitute an amorphous substance which, depending upon temperature, will be as solid as glass, or leathery, or rubbery, or, with much heat, will melt into a viscous liquid. Such plastics when in their solid state might be described, like glass, as supercooled liquids. This roughly describes the constitution of the "thermoplastic" family of plastics.

3. The other family of plastics, described as "thermosetting," does not rely merely upon entanglement of molecular "strands" to make the substance strong and keep it in a solid state. Instead, chemical cross-links lock the giant molecules together so that the material makes no transition from the glass-solid state when heated, but remains rigid and hard at all temperatures below that of actual chemical decomposition. How then can this thermosetting group of synthetics also be called plastics? The answer is that, at least at the time of fabrication of the product, any plastic will flow and can be molded.

4. This distinction between the two basic classes should suffice to alert the designer to a relative difference between these regarding a characteristic of plastics that can be very important to him: cold-flow, or "creep." Creep is characteristic of all materials used in building--steel, for example--the rate of permanent deformation is so slight as to be negligible in most instances. When using plastics as self-supporting elements (not to mention in load-bearing applications) this property must be kept in mind since it can be of considerable magnitude. The thermosetting plastics display much more resistance to creep than the thermoplastics, owing to their three-dimensional network of strong molecular cross-links.

5. Characteristics of Plastics as a Class of Materials. To begin with, plastics are generally corrosion-resistant. This property, of course, can be of overriding importance in certain construction applications. At least one resistant plastics material can be found for practically each corrosive condition found in building. Many instances can be cited (e.g., industrial piping) where plastics have far out-performed costly metals such as copper or stainless steel under corrosive conditions.

6. Plastics generally exhibit a low modulus of elasticity as compared with traditional structural materials (Chart 1).

7. Plastics tend to be good electrical insulators. It is probably safe to say that plastics came into widespread use in the electrical equipment field before any other.

8. In building, an important characteristics of plastics is that, being organic materials, they can be destroyed by fire.

9. Plastics' thermal conductivity is low. In the form of low-density foam, they provide some of the most efficient thermal insulators known today. The conductivity ("k" value) of polymethyl methacrylate is near the median value for the common plastics; the following approximate figures compare solid plastics and glass with representative insulating materials, including foamed polystyrene:

	Density lbs/cu. ft.	Thermal conductivity
Glass	156	6
Polymethyl methacrylate	75	1.4
Polystyrene	67	0.8
Corkboard	10	0.3
Mineral wool	12	0.27
Polystyrene foam	2	0.25

10. At the same time, the designer must keep in mind plastics' generally high thermal coefficient of expansion--several times that of the metals (Chart 2). The thermoplastic materials have higher expansion coefficients than do the thermosetting materials. Particularly when used in conjunction with metals, as with curtain-wall construction, special allowances must be made for this characteristic. Another important reminder for the architect: certain plastics are too brittle to accept inserts of a material with widely differing thermal-expansion characteristics.

11. Maximum service temperatures are low for the plastics as contrasted with structural building materials in common use. The cross-linked molecules of the thermosetting plastics are more heat resistant than those of thermoplastics (Chart 3). Reinforced plastics may be highly resistant when the basic resin is heat resistant and the reinforcing agent is an inorganic material.

CHART 1

MODULUS OF ELASTICITY
1,000,000 PSI

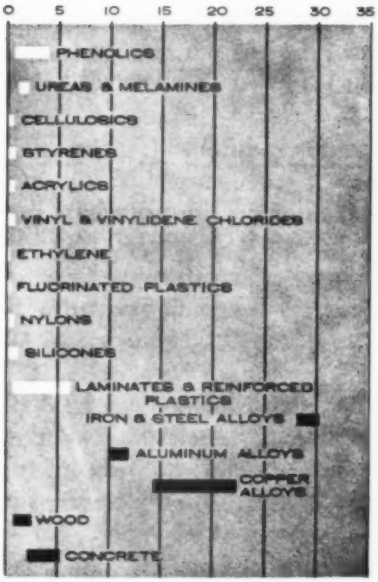


CHART 2

THERMAL EXPANSION
PER. DEG. F $\times 10^{-5}$

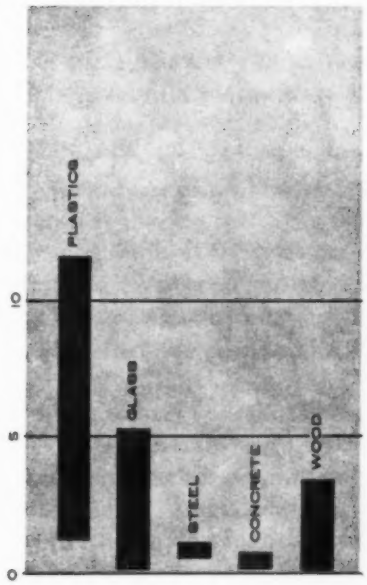


CHART 3

AVE. MAX. USE TEMP. – DEG. F

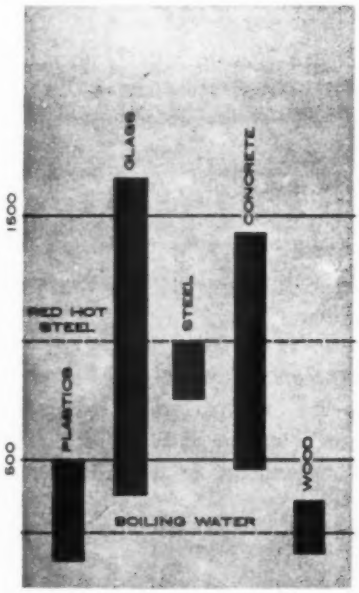
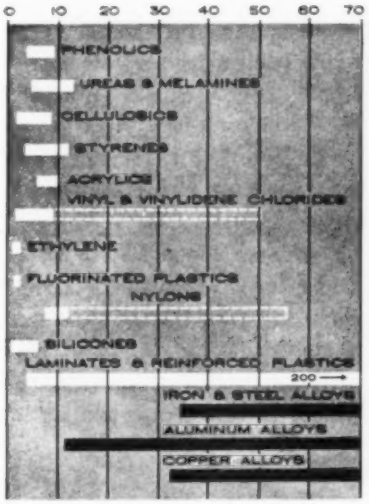


CHART 4

TENSILE STRENGTH 1000 PSI



12. As already noted, many plastics exhibit time-dependent plastic behavior: deform, or "creep," under load. The amount will depend upon the stress and temperature, as well as time.

13. Although in many design situations, stiffness is the controlling factor in the selection of a material, the generally low tensile strengths of unreinforced plstics can be contrasted with those of the metals (Chart 4).

14. Plastics of themselves all tend to be light in weight. Common unmodified polymers, or resins, range from a specific gravity of just under 0.9 for polypropylene, up to roughly 1.5 for polyvinyl chloride. In the face of the characteristic stated just previously, this makes possible favorable strength-to-weight ratios in comparison with other materials. If advantage can be gained through the geometry of the structural system, the fact that plastics materials are formed easily can make very lightweight construction possible: geodesic domes, sandwich panels, and so on.

15. Weathering is not just one process: It is the combined result of varying factors to which a material may be exposed outdoors. As yet, accelerated weathering tests conducted by laboratories do not simulate all the combinations and variations of factors that may be brought into play. Some of the relatively long-established plastics, such as phenolics and acrylics, have acquitted themselves well upward of 20 years. For many, however, there is no record of outdoor exposure extending over long periods. Meanwhile, certain plastics formulations as used in actual building products in existing installations show great promise, upon the basis of a few years' observation.

MAJOR PLASTICS NAMED

16. Acrylics. Popularly known trade names are "lucite" or "plexiglas," they combine the transparency of glass (but not its scratch-resistance) with plastics' shatterproof quality. Their weathering performance has been better than other common plastics. In building, they are typically used for light transmission or control, or for vision (diffusers for "bubble" skylights, etc.); also they have many decorative uses.

17. Cellulosics. (Primarily cellulose acetate or butyrate.) These plastics are amazingly tough. An interesting application of "butyrate" in building is as explosion-venting glazing of industrial sash.

18. Nylon. They are tough, have a low frictional coefficient, and they resist mechanical wear better than many metals. Hence, the rollers of this material for sliding doors and drawers; likewise, the solvent of nylon moving parts in locksets. Although other thermoplastics cost less, a high softening temperature makes it a potential candidate for domestic hot-water piping.

19. Polyethylene. Waxy and chemically insert, flexible even at low temperatures, this material is one of the most commonly known plastics.

20. Polystyrene. Non-water absorbent, it is found in colorful, but brittle, wall tiles. Copolymers of styrene with rubber can be very tough. Polystyrene is one of several plastics use in electric-lighting diffusers. In foamed form, it has become an important thermal insulation.

21. PVC (polyvinyl chloride). The resin itself is rigid; plasticizers are added for flexibility. This plastic is used for wear-resistant "vinyl" flooring.

22. Melamine and Urea. Hard, durable, and dimensionally stable, these quite similar plastics are resistant to chemicals, electrical potential and heat. This last property makes lower-priced urea useful for incandescent-light diffusion. With a wider color range, melamine is known to the public in the form of molded dishes.

23. Epoxy. Relatively new and still quite expensive, epoxy is already used in building because of its remarkable adhesive qualities and chemical resistance.

24. Alkyds. These appear chiefly as molded electrical parts.

25. Phenolic. Familiar for years in the old (black) telephone handsets, it is strong, durable, and both electrical- and heat-resistant. This low-cost "workhorse" plastic is limited to dark colors.

26. Polyester. Appears in film form under trade names such as "Mylar," "Videne." It has been known longer as the plastic most commonly used in large glass-fiber-reinforced translucent panels that are strong, rigid, and impact-resistant.

27. Urethane. Even newer than epoxy, this plastic is beginning to appear in coatings and as forms that are self-adhesive, also offering the advantages of being thermosetting.

28. Silicones. Being semi-inorganic substances, silicones might not be classified strictly as "plastics." In building, they are applied to masonry to improve its water repellance and weatherability.

McGarry, Frederick J.
STRUCTURAL CONSIDERATIONS
Progressive Architecture, June 1960. Pages 168-173. Illustrations.
624.011: 691.175 (100)

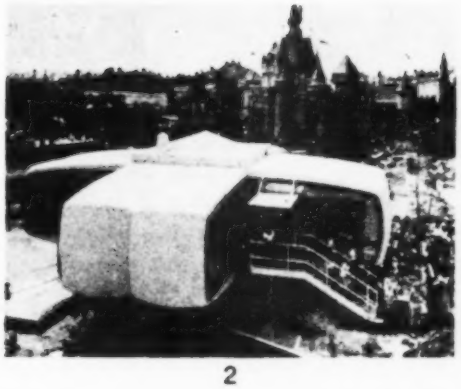
1. The use of plastics in construction merely as replacements for metal, wood, concrete, or glass is, of course, unsound. Frederick McGarry, Assistant Professor of Materials and Assistant Director of Plastics Research Laboratory, Massachusetts Institute of Technology, discusses appropriate structural uses for plastics and design considerations involved in using them successfully.

2. When the architect employs the term "structural," he usually envisions a material or member directly supporting the live and dead loads in a large immobile structure, most often a building. Can plastics do this? At present a few of them can, if one is willing to pay the price. Frequently, construction with plastics is the only way to fulfill some shelter function, the cost being secondary. Unless the latter is true, however, the use of plastics merely as replacements for metal, wood, concrete, or glass just doesn't make sense; they are too expensive and probably always will be. This fact is really the crux of the whole question, so let us examine it more fully.

3. One familiar use is the ground radome used to protect radar installations from the weather. A number of these, essentially identical in design, exist in remote geographical locations where transportation is limited. They need to be light and modular in design, the latter for economy of production and erection. They have to be weathertight and nonabsorbent to avoid electrical troubles; it is not critical that they be incombustible, since their contents are not hazardous in this respect and human occupancy of the shelter is limited. Either formed-plastic or stamped-metal panels would meet these requirements. But there is one additional factor: the structure must be transparent to electromagnetic radiation--the radar waves which are generated, transmitted and received by the apparatus within. Metal rejects such waves almost completely, while glass-fiber-reinforced polyesters or epoxies pass them like a window. Thus, the radomes must be built of plastics to fulfill their function.

4. On a less specialized level, consider dwelling house construction. Quite aside from its esthetic and function aspects, which many have questioned, the Monsanto House constitutes a strong statement that glass-fiber-reinforced plastics can be used for primary structural members. Although it has conveyed this message explicitly to the millions who have seen it, the same structure could have been executed as effectively with metal or perhaps even wood, in combination with other materials. The light-control possibilities of the translucent plastic were destroyed by external painting; its low thermal conductivity negated by the large areas of sheet glass; none of its unique electrical properties were utilized; its low density was offset by the size of the components chosen, which necessitated a mobile crane for handling and placement; the chemical and moisture

1



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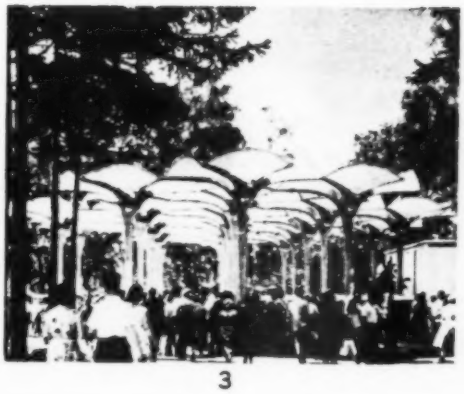

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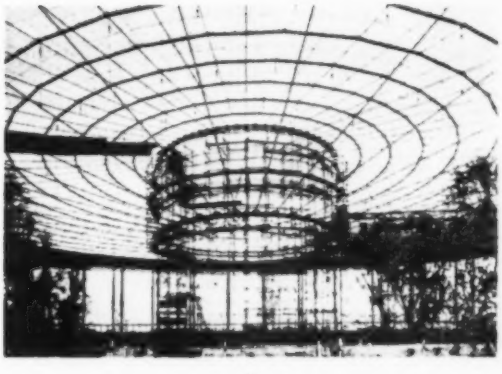


4

Structural uses of plastics: 1 radome built of glass-fiber-reinforced plastic; 2 Monsanto House at Disneyland in California; 3 canopy structure at the recent United States exposition at Moscow; 4 United States Pavillion at the Brussels Fair.

resistance of the plastic were not of primary functional value; its stiffness (about the same as that of wood), rather than its superior strength, was permitted to control the structural design; and the formability of the material was not very fully exploited. Thus the project represents essentially a tour de force, as its location suggests, but an interesting and provocative one to analyze.

5. By way of contrast, consider the umbrella-like design used at the recent exposition in Moscow. Intentionally propagandistic, it boldly asserts the architectural and engineering sophistication of our society within the context of a temporary and functional shelter whose cost, for a variety of reasons, had to be limited. The short time necessitated simple and rapid tooling--readily possible with reinforced plastics. The long delivery distance and the unknown qualities of labor called for a simple, lightweight, modular structure to be speedily erected with a minimum of equipment. Strength, rather than stiffness, largely controlled the design. At only a few critical points was additional, more expensive, reinforcement needed, since the formability of the material made shell action possible with an astonishingly thin skin. Control over both daylight and artificial light was achieved through the inherent translucency of the material. Its combustibility was retarded and inhibited by the inclusion of chlorine compounds; this was known to promote ultraviolet degradation and color changes, but the design statement required it to last only a few weeks and no visible effect would occur in such a brief interval.

6. Many of the preceding comments can be applied to the Brussels pavilion with equal validity, though with less rigor, since the primary structural elements there were steel--the plastics functioning only as skins to keep out wind and weather. Prefabricated, lightweight, strong and rigid where necessary, easily transported by air and installed at the site, transparent or translucent, and color-stable for the interval involved, the skins permitted the architect to achieve an economical shelter outstanding for simplicity, and delicacy despite its large size.

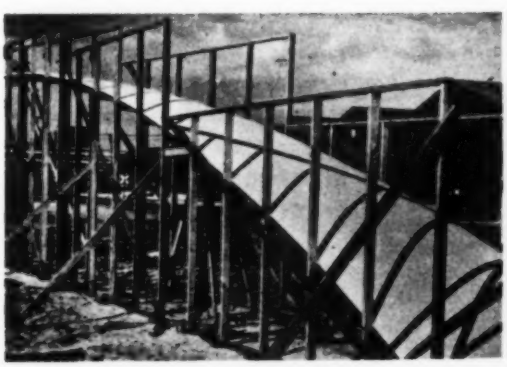
7. A similar type of panel has found growing acceptance in conventional buildings. Here again it serves primarily as a skin; its higher cost, compared to traditional materials, is offset by the thermal, visual, and weight advantages which it offers. It should be mentioned that the reinforced polyester materials used in this sandwich panel were carefully formulated for color stability, and from the earliest installations to the present time have performed satisfactorily in this respect.

8. Single, thin sheets (in color and with or without formed facing) of unreinforced acrylic, which is also notably stable for outdoor exposure, are being used as spandrel panels. For windows, the same plastic, can be formed into a saw-toothed profile, to effect light control inside the building. Colorful, self-cleaning by rain action, lightweight, shatter-resistant, economical to stiffen by simple shaping methods, thermally effective, the material offers many attributes which are simultaneously exploited in these applications, though primary structural loads are not sustained.

5

6

7



8

Structural uses of plastics: 5 and 6 plastic curtain-wall panels and window glazing in conventional buildings; 7 foamed plastics used in a radome; 8 polystyrene foam board which becomes integral part of reinforced concrete structure.

9. Now we can become a bit more precise in our understanding of structural plastics for buildings. Within a narrow definition of the term, the glass-fiber-reinforced polyesters and epoxies are truly structural and represent a kind of high-strength wood. They are so expensive compared to conventional materials, however, that there is no case for submitting to a vogue to use them solely for their structural properties. When their other properties become a significant factor, such as their low density, formability for additional stiffness, economics of formability in large numbers by machine methods, low thermal conductivity, chemical and moisture resistance, and perhaps electrical properties, their selection for structural functions may become defensible or even mandatory. When light control is desired, it too is available, though its outdoor life is shortened as transparent and translucent glass-fiber-reinforced plastics must be restored oftener than opaque ones, to keep their glossy surfaces intact.

10. Although plastic forms have needed some structural crutch, such as plywood, a new type of foam radome is being erected. When the technique is fully developed, this structure, 68 feet in diameter and 4.5 inches thick, will be delivered to the site as a few drums of liquid plastic with a mixing and dispensing machine, though what good is a foam dome, except for housing a radar set in some remote outpost? But the idea can be extended and varied. Here, preformed polystyrene foam planks, two inches thick, are sandwiched between wire mesh, just adequate to support the planks plus the live load of a workman dispensing pressurized concrete from a hose. When the outer mesh-reinforced concrete shell has been built up to the necessary thickness for the particular span, the inner surface can be covered with reinforced concrete or plaster in the same fashion. The foam plank is a light, cheap, low-labor-cost form board which serves permanently as thermal insulation and as a vapor barrier. Considering the present vogue of thin-shell construction, the ramifications of this development are arresting and significant, offering unusual design freedom to the architect wishing to work in the medium.

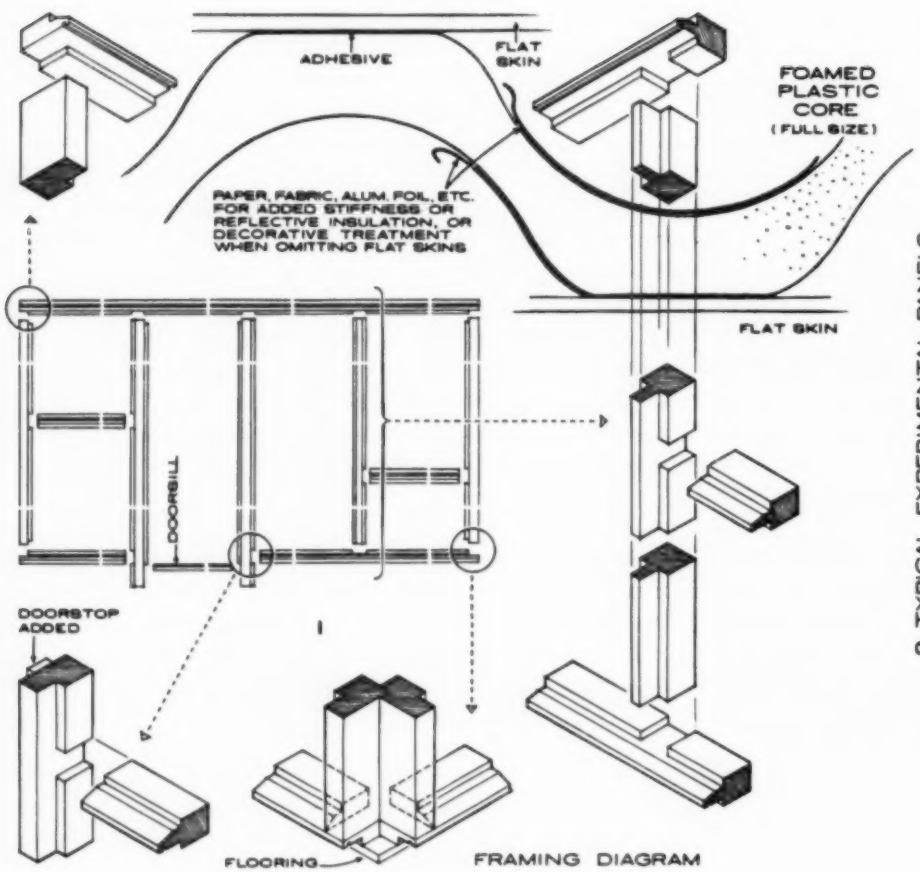
Frankl, Lee
RESIDENTIAL RESEARCH
Progressive Architecture, June 1960. Pages 174-179.
624.011: 691.175 (73)

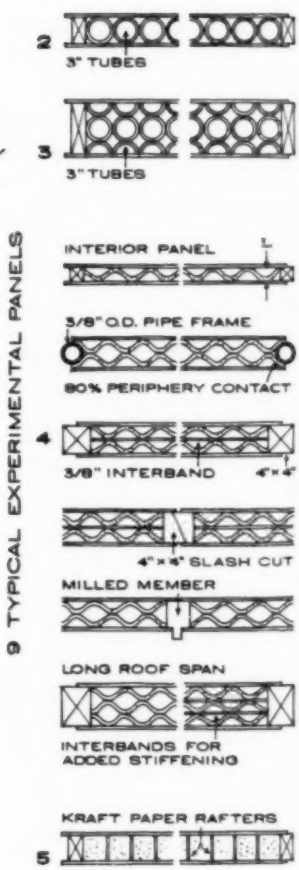
1. Several years ago, this author--a designer and independent researcher--established a laboratory on Cape Cod to study methods of producing house components that are particularly appropriate for the use of plastics. As a result of his research, he designed and erected his own home in Dennis, Massachusetts, the construction phase of which is presented here. In addition, the author presents details of future projects that are based on his experience with plastics components.

2. Before designing the house illustrated in this article, the author had developed a modular milled-member framing system and had built three houses based on variations of this method. With a puritanical approach to the use of horizontal and vertical grid lines, it was usually necessary to cut exterior materials to dimensions such as 3'-11" x 7'-10" and 3'-11 1/8" x 7'-10 3/8", with corresponding interior skins cut to 3'-9 3/8" x 7'-9 1/16" and 3'-10 3/8" x 7'-9 1/4". These odd dimensions led him to give a serious look at plastics as a means of forming odd-sized panels to fit a modular system.

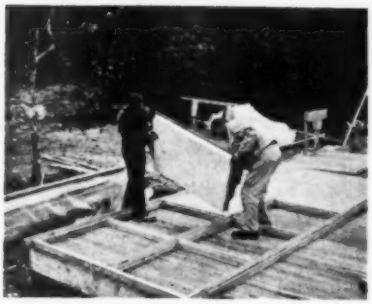
3. A decision to use Dylite (trade name for polystyrene foam) cores, for the first plastic-panel house, was reached. Before this house could be designed, however, it was necessary to determine the characteristics of the foam-core panels; i.e., their thickness, allowable spans, types of skin, glue lines, etc. Early tests of roof panels indicated that 2' x 8' panels with 3" cores could span a maximum of 8'. It was quickly realized that this span would be insufficient to meet a desired eave-to-roof span of 10'. Recalling earlier panel experiments using cardboard tubes as cores, several attempts were made to study the feasibility of substituting polystyrene-foam tubes as the cores. Several panels were made using tubes in various ways: the whole tube, whole tubes plus half tubes above and below, and various systems of rugated cores. (See illustration, p. 184). Epoxy adhesives were used to weld the tubes to each other and to the skins. Each of these experimental panels, when load tested, proved to be superior to solid-foam cores in resistance to deflection.

4. A foam plank was sliced vertically, through its depth, and 60 lb. Kraft-paper rafters were placed between the strips of foam. When laminated with resorcinol adhesives, the resultant panel proved to be resistant to bending. It was selected to span the 10' distance from ridge to eave. Actual roof panels used in the house were 3'-4" x 14'-0" in size, made with plywood exterior skins and Upson board on the opposite faces of the cores.


ADHESIVE
FLAT SKIN
FOAMED PLASTIC CORE (FULL SIZE)
PAPER, FABRIC, ALUM. FOIL, ETC. FOR ADDED STIFFNESS OR REFLECTIVE INSULATION, OR DECORATIVE TREATMENT WHEN OMITTING FLAT SKINS
FLAT SKIN
DOORSTOP ADDED
FLOORING
FRAMING DIAGRAM


9 TYPICAL EXPERIMENTAL PANELS
2
3" TUBES
3
3" TUBES
INTERIOR PANEL
3/8" O.D. PIPE FRAME
80% PERIPHERY CONTACT
4
3/8" INTERBAND
4" × 4" SLASH CUT
MILLED MEMBER
LONG ROOF SPAN
INTERBANDS FOR ADDED STIFFENING
KRAFT PAPER RAFTERS
5

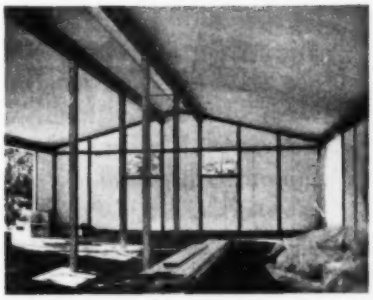
Floor of house is single deck of 1 1/2" oak "Doweloc." In background is concrete-block garage that forms far wall of the breezeway.



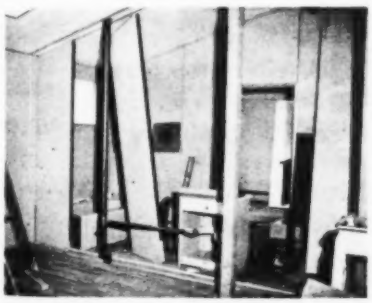
Sandwich panels, of foamed-styrene core and "Texture 111" plywood exterior skin, are inserted in rabbeted edges of milled framing.

Four exterior walls are plumbed. Ridge beams and posts (designed to fall in closet areas) are then positioned and fastened.

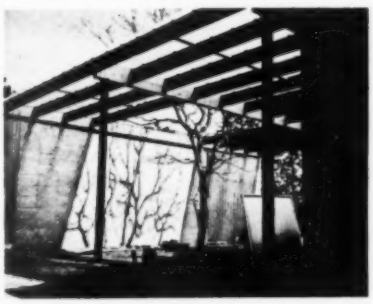
First roof panel, of foam core and 1/4" exterior-grade plywood skins, being placed. Weight of 14" panel is approximately 140 lbs.



Roof panels, fully in place, are V jointed. Large openings in long walls are for double-glazed acrylic doors which have embedments.



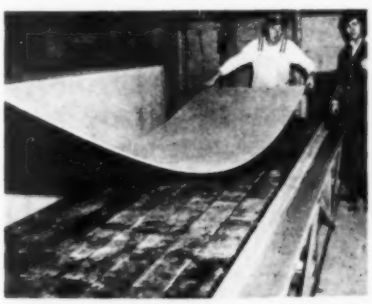
Plumbing walls are of 1 1/16" foam-cored double-faced panels. All interior walls were assembled and fastened by 4 men in 5 hrs.



View of breezeway and stacked-block garage wall. Roof grid accommodates oak tree; roofing material is corrugated polyester.

Over-all view of completed house. Exterior corners are filled with finish 4" x 4" which fits into rabbeted, milled members.

Later step in panel construction shows adhesive being rolled onto surface of foamed styrene to bond skin securely to panel.



Exterior skin is draped over foamed-styrene core. Unit is then pressed to insure tight bond between the component materials.

Scene from "behind-the-barn" operation: improvised pressing methods use old containers, shims under struts to ceiling rafters.

5. The milled members and panels for each exterior wall were assembled on the floor deck. Four men assembled and tipped up each wall in one hour. The 22 roof panels were placed and fastened in four hours. Asphalt shingles were then applied to the roof and 1/4" cherry-plywood skins to the inside of the exterior walls. The fixed windows are insulating: two sheets of glass were placed in an extruded-neoprene surround, then set into the milled opening and secured by a back-band. Exterior and interior doors have polystyrene-foam cores which inhibit the passage of moisture and minimize warping. To take care of expansion and contraction, the acrylic was set against neoprene tubing. Heating is by electric baseboard, made economically feasible by the excellent insulating property of the foam.

6. Critical Evaluations. Cost differences are related entirely to costs of skins and the basic structure remains the same--a quality product superior to conventional stud walls with conventional insulation. It soon became apparent, however, that a mistake was made in using new materials in components that imitated nonfoam products. Unbalanced panels were used throughout--roof panels have 1/4" plywood on the outside faces and Upsom board on the interiors; exterior wall panels have plywood on the outside and Upson board, cherry plywood, or 1/8" Masonite on the inside. However, what is a balanced sandwich panel? Is it a core with similar skins on both surfaces? Or is it a panel with 70 F temperature on its interior face and--10 to 150 F temperatures on the weather surfaces, with varying degrees of moisture content? To what degree does the moisture-inhibiting factor of the foam core allow the design of unbalanced-panel construction?

7. Furthermore, advantage was not taken of new structural arrangements of the parts of the panels made possible by the foam cores. Jointing methods, except at the windows, did not improve on conventional methods. Shop procedures for laminating panels was complicated.

8. Conclusions. There is no doubt that plastics--in combination with lumber, metals, and paper--can play a prominent role in component design and manufacture. A number of factors, however, stand in the way of their fullest realization.

a. Policing by the industry, to make certain that formulations are correct, is essential.
b. The architect needs better information to be able to specify plastics properly.
c. Teamwork among chemists, architects, engineers, and contractors is necessary for the proper design of components.
d. All components must be designed to relate to the final structure.
e. Necessity for using modular co-ordination cannot be overstressed. Correlated compoents and the ability to assemble on the site, demand such a system.

Carlos Oyarzún Salinas

USE OF POPULATION DATA IN THE ANALYSIS OF ECONOMIC DEVELOPMENT PROBLEMS

United Nations Seminar on Evaluation and Utilization of Population Census Data in Asia and the Far East, 20 June - 8 July 1960. Bombay, India. Mimeographed Paper. 10 Pages.

312: 338.984 (100)

1. Carlos Oyarzún Salinas is Professor of Economic Analysis and Economic Development, Interamerican Training Centre for Economic and Financial Statistics, Santiago, Chile. In the following paper, pages 190-194, tabulations to which economic development policies could be related are outlined; here, some of the specific analyses from these tabulations are pointed out.

2. Population, Production and Standard of Living. The main questions to which long-term series on total population and national product can help to answer the following:

a. To what extent did the per capita real product vary during the period under review?
b. If the data available cover a wide period, the following questions could be put:
   (1) What are the various stages characterizing the long-term movement in product per inhabitant?
   (2) What phases correspond to accelerated growth, to a decline, or to stable conditions.
c. With reference to the preceding: To what extent has demographic growth affected the growth of each stage of development in which are catalogued long-term movement between population and national product?
d. If detailed data on population are available, a question to be investigated might be: What demographic factors have affected the growth of the total population, and to what extent could such factors change in the course of development?

3. At a very preliminary state, programming of economic development implies projecting population and product series as a basis for the first outlines of a concrete policy. Projection of the gross national product is the hypothesis of an economic development policy, since it involves fixing the over-all target of a programme. The growth rate of the product is in relation to the coefficient of net investment and to the product-capital ratio. If the latter is known, as well as the increment rate of the product, the relative amount of investment required can be determined. If we use

this formula to equalize the rhythm of increase in the product with that of the population, we have the answer to the following question: What is the annual amount of investment required so that the increase in output will satisfy the increment in population? Looked at from another angle, it could be put like this: What financial effort is needed, in terms of internal and external savings, for the development of production to cover the rise in population?

4. The Population and Behaviour of Demand in Economic Growth. The manner of growth of internal demand is a key feature in the study of development processes. In the under-developed economies consumer demand is closely linked with demographic changes. Some questions of analysis follow:

a. What increment in private consumption will satisfy the increase in population?
b. To what extent is expansion of private consumption due to expenditure by consumers in urban and in rural areas?
c. How are increments in private consumption distributed among the various groups of goods and services? In what proportion is the demand in each category due to expenditure in the urban and the rural areas?
d. In what proportion is the domestic consumer demand distributed by regions or principal cities?

5. Population and Private Savings Coefficient in Development Process. Statistical information on urban and rural population, regional distribution and composition by age, can be applied in the financial programming of economic development. In fact, various studies reveal that the urban population has greater propensity to save than the rural population. If the process of growth is accompanied by a rapid rate of urbanization, it is possible to anticipate that, even in the face of a rapid expansion or urban incomes, the margin of savings that would be transferred to investment will not show a substantial increase.

6. Furthermore, over a long term, the savings function is influenced by the distribution of population according to age groups. If changes in the age of a population result in a greater concentration between the 30 and 50 year span, the behaviour of the savings function might possibly favour the financing of a higher level of investment. On the other hand, for both lower and higher age levels, it could be claimed that the savings rate would not increase and might even experience a decline.

7. Through the analysis of the distribution of income and population by regions, it is possible to evaluate the process of savings formation according to the location of centres generating economic surpluses for investment. The projection of regional savings in a development plan, and the location of populations, constitute a basis for the establishment of institutions and financial machinery adapted to the characteristics of each area.

8. Economically Active Population, Productivity and Employment of the Labour Force in the Development Process. Population data combined with statistics of product and capital according to production sectors, enable the following questions to be answered:

a. To what extent is economic development creating employment opportunities for the population entering the labour market?
b. How do long-term changes occur in the occupational structure? Since changes in the occupational structure are associated with the transformation experienced by the productive system in regard to amount of capital accumulated by sector, it is obvious that the availability of information on distribution of the labour force during different periods provides us with a well-founded approximate estimate of shifts in the utilization of economic resources. Furthermore, it is highly important for the under-developed economies that employment in the industrial sector be split up into three groups: home industries, handicrafts and true manufacturing industries. A further useful classification, with a view to going deeper into the industrial structure, is the splitting up of gainfully occupied population by size of industry, according to the number employed.
c. How are the changes in occupational structure linked with man-power productivity levels in each sector?
d. Labour productivity and real wages.
e. Projection of the occupational structure.
f. Economically active population, regional distribution and mobility of manpower.
g. Economic growth and demand for skilled labour. This is significant because the extent to which skilled labour fails to expand with respect to demand requirements, brings about a stagnation of the development process. Therefore the following must be considered:
    (1) A source of skilled labour in the early stages is produced by the gradual replacement of the home industries and handicraft sector.
    (2) A planned and selective immigration policy could supply domestic deficiencies of human resources.
    (3) When the economic system expands in the secondary and tertiary centres of activity, it absorbs manpower from the primary sector, in particular from agriculture.
    (4) Professional and technical training constitutes the most most permanent source of skilled labour supply.

United Nations Bureau of Social Affairs
POPULATION CENSUS TABULATIONS FOR ECONOMIC AND SOCIAL POLICY-MAKING IN COUNTRIES OF ASIA AND THE FAR EAST
United Nations Seminar on Evaluation and Utilization of Population Census Data in Asia and the Far East, 20 June - 8 July 1960, Bombay, India.
Mimeographed Paper. 29 Pages.
312: 338.984 (100)

1. This paper relates many of the specialized papers which EKISTICS has abstracted from both the Censuses Seminars in Chile and India to the ekistic and planning problems related to development. While, directed specifically to the participants of the seminar from Asia and the Far East, the paper is probably applicable to any of the under-developed nations and regions of the world.

2. Lists are given of the most useful census tabulations for the most important types of demographic, economic and social investigations relevant to policy-making and planning. These are not intended as the prescription for a programme of tabulations to be undertaken in each country. It is recognized that the tabulations of a population census are not designed solely to provide information for use in policy-making and planning. Census statistics also serve many other kinds of scientific, administrative, legal and commercial purposes, which are not considered here. Moreover, the questions which arise in connexion with social and economic planning and policy-making are not the same in all countries of the region, and the consequent needs for certain types of census data differ from country to country.

3. Analysis of Population Structure and Components of Population Growth, for the Country as a Whole. Relevant tabulations:

a. Total population by sex and age.
b. Native and foreign-born population by sex and age groups.
c. Women by age and number of children born.
d. Ethnic or nationality groups of the population by sex and age groups.

4. Analysis of Population Structure and Components of Population Growth, for Parts of the Country. Relevant tabulations:

a. Population of major, intermediate and minor territorial divisions, the capital and principal cities, and localities classified by number of inhabitants, by sex.
b. Population by sex and age.
c. Women by age and number of children born.
d. Ethnic or nationality groups of the population by sex and age groups.

5. For this, the area classifications most likely to be required include:

a. Urban and rural sectors of the country as a whole and of each major territorial division.
b. Each of the principal cities or metropolitan districts.
c. A subdivision of the rural sectors with regard to the predominant local type of agriculture, specifying at least two categories:
   (1) localities where archaic, subsistence agriculture predominates, and
   (2) localities where agriculture is more modern and there is a considerable production for the market.

6. Studies of Factors Affecting Fertility. The tabulations under this heading furnish material for studies of relations between fertility and economic and social factors as a means of improving the reliability of population projections and constructing models of economic and social development which take account of relations between demographic and other variables, and as an aid to formulation of policies in matters relating to population growth. Relevant tabulations:

a. Population by sex and age groups, women by age and number of children born, and population by ethnic or nationality groups as listed in 4 above.
b. Population by marital status, sex and age.

7. Studies of Population Distribution. The tabulations under this heading are useful for studies of the density and distribution of population in relation to land and other resources, and for the aid to the formulation of policies and programmes aimed at improving the balance between the distribution of population and resources. Relevant tabulations:

a. Population of major, intermediate and minor territorial divisions and of the capital and principal cities.
b. Urban and rural population, and population of localities classified by number of inhabitants.
c. Economically active population by branch of activity and sex.
d. Population dependent upon agriculture.

8. Studies of Internal Migration. (See also EKISTICS 9:52 pp. 97-101 and 9:55 pp. 373-378) The tabulations under this heading provide material for studies of the volume and direction of migration within the country, of the factors which influence internal migration and its effects upon population growth and structure in various parts of the country, and of the characteristics of the migrants. These studies are important as an aid to the preparation of population projections for parts of the country, to the formulation of policies and programmes relevant to redistribution

of the population, and to the planning of measures to provide for the needs of migrants in the areas of in-migration. Relevant tabulations:

a. Native population by major territorial division of birth, by sex.
b. For each major territorial division, in each of the other major territorial divisions, and outside the country.
c. For each of the principal cities: population born within the city, elsewhere in the same major territorial division, in each of the major territorial divisions, and outside the country.
d. For the intermediate or minor territorial divisions, or economic and social regions and sub-regions:
   (1) persons enumerated in this area, born in the same area;
   (2) persons enumerated in this area, born elsewhere in the country;
   (3) persons enumerated in this area, born outside the country;
   (4) persons born in this area, enumerated elsewhere in the country.
f. For selected areas of in-migration: persons enumerated in this area, born elsewhere in the country, classified by place of birth in accordance with whatever scheme appears suitable in the circumstances.
g. For urban and rural sectors of each major territorial division (or of social and economic regions): population born in the urban sector of the same territorial division or region, in the rural sector of the same territorial division or region, in urban areas elsewhere in the country, in rural areas elsewhere in the country, and outside the country.

9. Studies of Demographic and Economic Aspects of Manpower. (See also EKISTICS 9:56 pp. 443-456.) Tabulations in regard to demographic structure and growth of the economically active population provide the necessary material for analytical evaluation of the quality of the census data on the size and structure of the economically active population, for studies of relationships between growth and structure of the total population and growth of the economically active population, and for projections of the economically active population. Relevant tabulations:

a. Economically active and inactive population by sex and age.
b. Economically active population by status, sex and age.
c. Economically active population by industry, sex and age.
d. Economically active population by occupation, sex and age.
f. Economically active and inactive population by marital status, sex and age.
g. Economically active population by marital status, occupation, sex and age.
h. Sub-groups of population not economically active.

10. Tabulations in regard to types of economic activities provide a statistical inventory of manpower and its utilization in various types of economic activities, which is indispensable for the formulation of policies and programmes aimed at making the most effective use of human resources, for studies of the productivity of labour and of the structure of the national economy, and for many other types of economic analyses relevant to the planning of economic development. Relevant tabulations:

a. Economically active males and females by industry and status.
b. Economically active males and females by occupation and status.
c. Data on secondary occupation, industry and status.

11. The tabulations on unemployment and under-employment which are relevant:

a. Employed and unemployed persons by sex and age.
b. Measures of under-employment such as numbers of
   (1) self-employed and unpaid family workers in agriculture who operate farms of less than a specified size, or raise certain kinds of crops, or operate largely subsistence, or semi-subsistence farms;
   (2) persons working less than a specified number of hours per week or weeks per year;
   (3) persons both working and looking for work.

12. Demographic Studies Relevant to Problems of Education. (See also EKISTICS 9:54, pp. 274-280.) The tabulations under this heading constitute the main statistical basis for assessment of the country's situation as regards education and its needs for educational development, for studies of the effectiveness of the educational system, and for the planning of school construction and other aspects of educational programmes. Relevant tabulations:

a. Population 15 years of age and over by literacy, sex and age.
b. Population by level of education completed, sex and age.
c. Population of school and pre-school ages by single years of age and sex.
d. Population 5-24 or 5-29 years of age by school attendance, sex and age.
e. Population of school age by language and sex.

13. Demographic Studies Relevant to Problems of Housing. (See also EKISTICS 10:57 pp. 62-76.) These tabulations can be used to supplement the information relating to the adequacy or deficiency of existing housing which is obtained from a housing census. Relevant tabulations:

a. Population by size and class of household.
b. Population in private households by structural types and size.
c. Population by marital status, sex and age.

14. Demographic Indicators of the Level of Living. (See also EKISTICS 9:52, pp. 104-109.) Indicators which can be derived from tabulations included in the international standard programme, for the country as a whole and major territorial divisions:

a. Estimates of crude death rate, expectation of life at birth, and expectation of life at various ages.
b. Distribution of economically active population, both sexes or males only, by major industry groups.
c. Proportion of illiterates among the population 15 years old and over, both sexes or each sex separately.
d. Median level of education of population above a given age limit, both sexes or each sex separately.
e. Proportion of population of school age attending school.
f. Measures of unemployment and under-employment.

Doxiadis Associates
EASTWICK REDEVELOPMENT PROJECT
728: 711.58 (73)

Extract from the News Release Issued by the Office of the Mayor of Philadelphia.

1. The Redevelopment Authority chose a nationally known aluminum company and two Philadelphia builders to redevelop Eastwick. They are Reynolds Metals Co., of Richmond, Virginia, and the brothers, Samuel A. and Henry A. Berger, of this city. Their selection as redevelopers was announced at a meeting of the Authority by its chairman, Michael von Moschzisker. Although details remain to be worked out, the 10-year Eastwick rebuilding task will proceed in general along the lines of the plan of Dr. Constantinos Doxiadis, Greek architect and planner associated with the Reynolds-Berger group.

2. The Reynolds-Berger team will have the responsibility, under contract with the Redevelopment Authority, of translating into brick, mortar and metal the plans for a modern new community of 60,000 on the four square miles in the city's southwestern corner. There will be more than 10,000 new houses, carefully placed amid settings of parks, boulevards, greenways, shopping centers, schools, churches and playgrounds, as well as an industrial park covering more than a third of the 2506-acre tract but shielded from it by a greenbelt. It is the nation's largest urban renewal undertaking in the area.

3. Representing a gross cost of $96 million to the City and Federal governments for acquisition and preparation of the land, private investment is expected to bring the total outlay in the new Eastwick to more than a third of a billion dollars. The City expects to recoup its $35 million share of the initial cost through the creation of new tax sources returning millions of dollars annually in real estate, mercantile and wage taxes, in addition to benefits in the form of the well-being of its citizens through good living conditions and jobs in the new industries.

4. "This is an important day in the history of Philadelphia," said von Moschzisker. "We are going to add, within the confines of our city, a community of 60,000 persons, the equivalent of a small city. Succeeding generations will have cause to be thankful for the foresight and courage of our government in conceiving and undertaking such a task." He added that he was especially pleased that the redevelopment of Eastwick will be "under a plan produced by one of the world's great community designers, Dr. Doxiadis."

5. Proposals for Eastwick redevelopment were received from three sets of prospective redevelopers last September 17 but after studying them the Authority announced it would postpone a decision in the hopes that competing bidders would agree among

themselves either on a single joint proposal or division of the undertaking among themselves. Efforts to bring about a merger broke down because of the complications involved in different organizations working together, and the Authority finally made the decision to choose the Reynolds-Berger team.

6. The Doxiadis plan envisions a series of residential sectors of "super-blocks" connected by a central greenway along which community facilities will be conveniently spaced. Pedestrians will be able to travel on foot to all parts of their "super-blocks" without running the danger of heavy traffic. Spine streets will carry major traffic around the residential sectors and small streets will lead into the interior. The smallest streets along which the residents will drive to and from homes will end in cul-de-sacs, thus effectively keeping out through traffic.

7. Today's selection of the redevelopers marked the beginning of a period of intense activity which will lead to the actual construction sometime next year. Preliminary steps before construction include such necessary activity as drafting of preliminary agreements; approval by City Council and the Federal urban renewal agency; preparation of detailed subdivision plans, which alone require four to five months; and public hearings before City Council on the final contracts with the redevelopers.

8. Although the first houses are expected to be built in 1961, it may be ten years before all 10,000 new homes are completed and the new community of 60,000 people is in being. The city will not have to wait that long to begin benefitting from its investment in Eastwick. As new properties go up, they will move into the tax rolls. The eventual increase in revenue to the city runs into millions of dollars annually. It includes an increase of more than $4 million a year in real estate taxes alone, and a boost of nearly $3 million dollars a year in school taxes. The industrial, commercial and institutional enterprises are expected to provide about 23,000 jobs with an annual payroll of more than $105 million a year. The city's wage tax return on this would be more than a million and a half dollars a year. This does not take into account the increased revenue resulting from the general business stimulation.

9. Prior to acquisition of the Eastwick area, with its 2,700 buildings and 4,000 vacant lots, in December 1958, a heavy percentage of the properties were tax delinquent and the total city tax levy was only $200,000 a year. Eastwick has for years presented problems to the city. Much of it was swampland, flooded over periodically. There were good houses on high, dry ground, but there were also poor quality houses and even shacks, some of them occupied by squatters, who had no idea of who owned the land or the structures. Wide open fields were to be found, and neat little gardens. Also junk yards and auto graveyards abounded, not to mention sewage-laden streams running through the area because it was too low for an underground sewage system.

10. Before the area could be reclaimed as a modern, healthful area, pleasant to live in and productive of real estate taxes from its home-owners and wage and industrial taxes from its industries, the area first had to be filled in to bring it up to grade.

11. The Federal Government found Eastwick eligible for financial assistance under Title I of the National Housing Act and pledged a grant of $22 million. It also guaranteed a loan of $65 million. Initial estimates of the cost of acquisition have been exceeded, and the government is expected to increase these figures.

12. Since the net cost of acquiring and clearing the 2,500 Eastwick acres was forecast as $54 million, after sale of the land to private redevelopers for $42 million, there was still a gap of more than $32 million the city was required to put up. This amounted to more than the one-third matching funds required of cities under Title I, and Philadelphia has been given credit for more than $20 million of local expenditures to be applied on other projects.

13. The proposal for the Eastwick redevelopment was approved by City Council on May 26, 1958, and the Redevelopment Authority became the titular owner of 2,500 improved properties and 4,000 vacant lots through the process of condemnation on December 8, 1958. Since that time, more than 1,800 property owners have agreed through negotiation on a sale price, while others are seeking higher prices through appeals to the Board of View.

14. Last June, the American Dredging Company began pouring hydraulic fill into large sections of Eastwick, under a contract to put in nearly nine million cubic yards for approximately $5 million dollars. In August, the first demolition contracts were let and work of razing existing structures began. Only a handful of buildings are left in Stage I to be cleared.

Extracts from Report to the Redevelopment Authority of the City of Philadelphia: Sponsors - Reynolds Metals Company and Mr. Samuel A. Berger and Mr. Henry A. Berger; Consultants - Doxiadis Associates.

15. Real communities are made up of people and human relationships. Unhappy people create unhappy communities. In planning new communities, a planner must be conscious of human needs and of the necessity to provide a healthy and inspring environment which would release human potential and stimulate individual growth and family development.

16. The planning of the new Eastwick community was guided by the following five fundamental principles:

*UNITY OF PURPOSE: To create a happy community by satisfying the needs--economic, social, political, technical and aesthetic - cultural-- of the people that are to live in it.

*HIERARCHY OF FUNCTIONS: The number, kind and type of services to be provided are directly related to the people to be served. Every family needs a house and some need a common open area and a corner shop. Several groups of families need a playground, a school, some local shopping facilities, and some larger relaxation area. Larger numbers of families need places of worship, more schools, a shopping center, a park, health facilities and community meeting places.

*THE FOUR DIMENSIONS: Cities are usually built in three dimensions-- length, width and height. However, there is a fourth, vital dimension, Time, which is all-important in our fast moving era. Time introduces a dynamic element into the life of a city. Economic, industrial, population and cultural changes affect the size, shape, contents and character of the city. Consequently, the city planner must plan for the future while building for the present.

*THREE MASTERS AND THREE SCALES: In the past, cities had only one master, man. In our time, man has almost been superceded by the new master, the automobile. A third master is rapidly imposing its influence, the airplane. The solution is to create a new city with three scales: the human scale, the scale of the automobile and that of the airplane. Predominance should lie in the real master, man, and the fulfillment of human needs.

*THE RHYTHM: Every city has a rhythm, as the tradition-bound Philadelphia does. For centuries Philadelphia has been building on the basis of a certain

EASTWICK, A PART OF THE CITY OF PHILADELPHIA

type of row-house, in a particular street pattern, with certain basic dimensions. In Eastwick, within an existing metropolitan area, a new community shall be created, in a harmony with the existing rhythm of the city. At the same time, this new community will be a landmark in the transition toward a new pattern of urban life.

17. Eastwick presents a challenge and unique opportunities. To build a new community of this great size, so close to the heart of a major metropolitan area; to build it in terms of today's human needs and possibilities, and at the same time to plan for its continued life, its growth and change as a part of the Philadelphia of the future: these are indeed opportunities.

18. In Eastwick we must prepare for the city of the future: In order to do this we must employ, with as much consistency as possible, all the techniques which will permit the new Eastwick to grow. We must further plan to permit it to change in response to evolving social, economic and other motivating forces.

19. The size of Eastwick, as well as its anticipated development in successive stages, will greatly facilitate this kind of planning. But the principles of planning employed must assure the certainty of making the most of these advantages. These principles rely on the acceptance and utilization of variety in the techniques of creating a physically and socially coherent community.

20. One of the basic conditions of Eastwick is that it is a part of a large City; and this must remain. It has to be even better connected with the city than at present. At the same time it has to achieve a character of its own; a distinctive and satisfying character. The challenge is complicated by the existing conditions in the area, yet Eastwick is privileged with the opportunity to provide indisputable evidence of how much can be achieved by successfully applying creative planning to problems of areas in transition from the old to the new.

21. General Plan. The whole Eastwick area is defined by highways. Within it, we must have a network of major secondary and other roads. We have fundamentally attempted to create an area consisting of major sectors as the basic units of development, instead of the blocks which have been units corresponding to ways of life of the past, corresponding to the pedestrian and horse-cart age. These sectors are in many ways conditioned by the parts of the city, and by highways and railway lines which exist and have to be maintained.

22. Beginning from the north, out of the great number of streets and avenues crossing the already developed area, we should keep only the few which are going to carry the through traffic. The remaining ones will become internal residential streets. The remaining ones will become internal residential streets. The pattern of the area already existing is such that we think it is feasible and advisable to retain about one

out of every five streets for through traffic. The distances between those streets provided for the through traffic will then be of the order of 1000 yards.

23. The New Sectors. These sectors are such as to allow the implementation of the principles of different scales; for the inhabitants, or the human scale; for the motor car, or the machine scale.

24. Every such sector can have an entity of its own, a character of its own, and all of them can form the major Eastwick area.

25. The whole area can keep its complete entity, if the major streets and the pedestrian connection over Island Avenue and at other points can be at a different level, so that people can walk from one end of the area to the other, without crossing the major traffic of Island Avenue; and its people can drive from one part of the area to another, from residential into the shopping center, without crossing the major traffic. This can easily be achieved among Sectors 5, 7, 10 and 11 (see Page 203), because Island Avenue passes lower than the future level of these sectors, but even if this cannot be achieved for financial reasons in the first state of the project, it will have to be done finally some day. It has therefore been planned in this way.

26. We have created a gridiron pattern of primary roads which divide the area of the project into sixteen sectors shown in the outline map (Page 203).

Sector 1. Starting from the North we have Sector 1, the smallest one which is industrial by necessity.

Sector 2, residential, consisting mainly of existing houses with very few additions.

Sector 3, new, industrial.

Sector 4, residential built up on more than one-third of it.

Sector 5, new, industrial.

Sector 6, only part of which belongs to the Eastwick project, by necessity falls within a broader sector to be developed north of it to include big parts of the residential areas confined between 70th Street, Dicks Avenue and Island Avenue.

Sector 7, new, residential, with part of it already built.

Sector 8, new, industrial, with a part of it already covered by two industries.

Sector 9, industrial.

Sector 10, residential, with a big part of it already built and to be maintained.

Sector 11, residential, with several parts of it built and to be maintained.

Sector 12, primarily open spaces and parks.

Sector 13, new residential, with some few buildings existing.

Sector 14, new, residential, with few parts existing.

Sector 15, industrial.

Sector 16, residential or institutional.

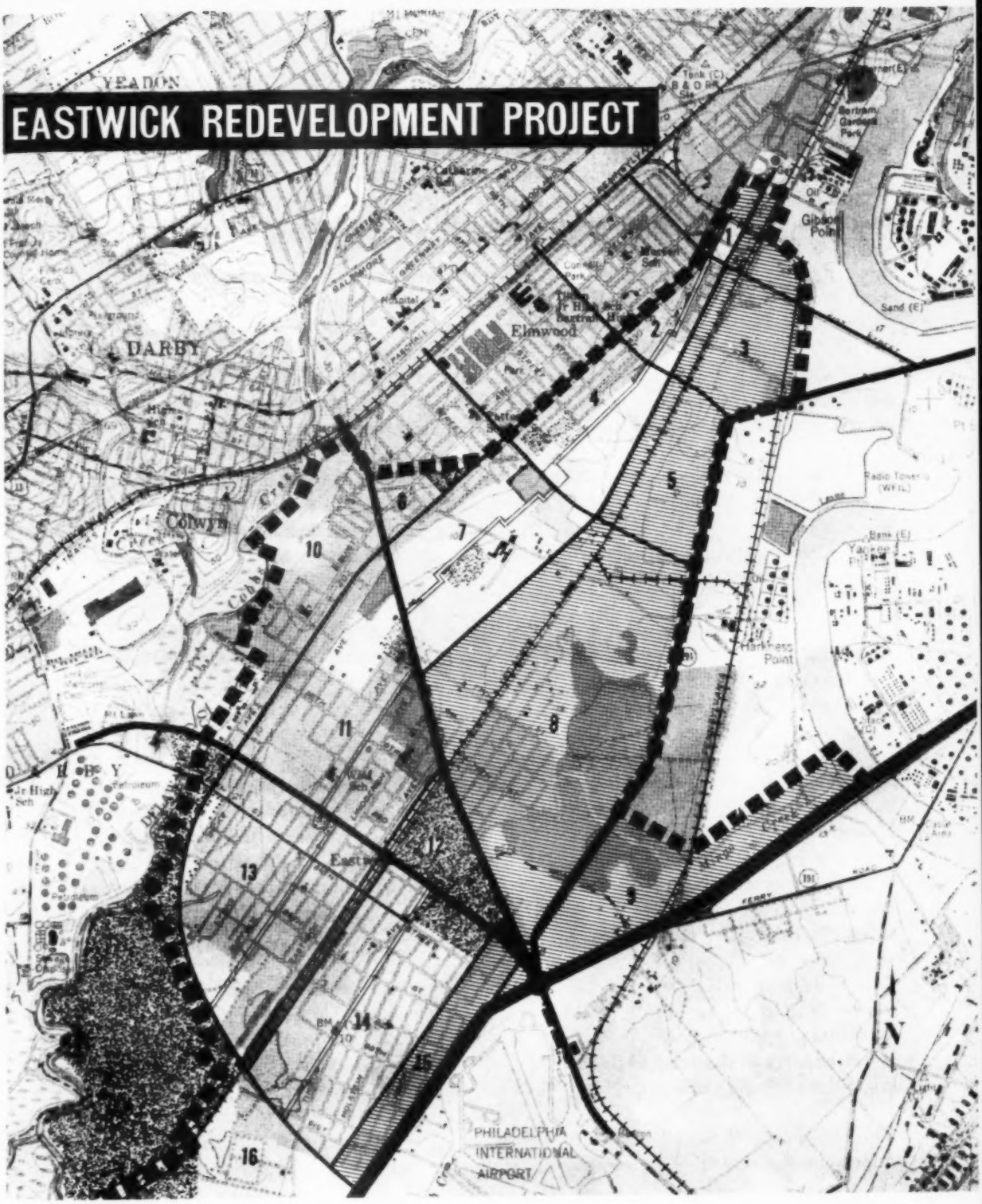
27. Streets and Parks. The whole area is going to be flanked by two highways. At a second level, there will be the major streets passing through the area.

28. At the third level of hierarchy are the secondary, or "collector" roads, which are anticipated within the residential community, and eventually probably the industrial community, depending on the size of the industrial developments which will be attracted in the area. These feed vertically to the major streets, and are in turn fed by the smallest road element, the cul-de-sac.

29. It is considered wise to make a well-defined distinction of the level of importance of each road by such a device as appropriately coloring the pavement. In this way, every driver will automatically know the importance of the road he is driving on, and what maximum speed he is allowed to develop.

30. This will make many of the signs along the roads unnecessary and will contribute enormously to the creation of a more pleasant atmosphere within the community.

31. In the same way in which we have a distribution of functions of traffic along the roads meant for car traffic, we have developed a hierarchy of parks and relaxation areas which are free for the pedestrians.


EASTWICK REDEVELOPMENT PROJECT
YEADON
DARBY
Elmwood
COBBS CREEK
Gibson Point
Sand (E)
Radio Tower (WFIL)
Harkness Point
PHILADELPHIA INTERNATIONAL AIRPORT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
N

32. While planning for greenways, squares and parks, it should not be forgotten that several parts of Eastwick are already rich with trees, some of which are quite well developed and beautiful. It is for this reason that the proposed plan should not be considered in this respect as rigid and finalized. This can only be justified after a complete and careful survey of all existing trees, so that the whole area is prevented from being indiscriminately flattened and then built and replanted.

33. Three levels of park areas will serve the wide spectrum of needs from the most elemental one of playgrounds for tots in the immediate proximity to the house to the largest one of a fair which concerns the entire region of Eastwick.

34. Of equal importance with the parks are the pedestrian lanes which begin with the smallest ones within the cluster of houses, pass to larger ones, and land on the main pedestrian greenway or esplanade bisecting every sector.

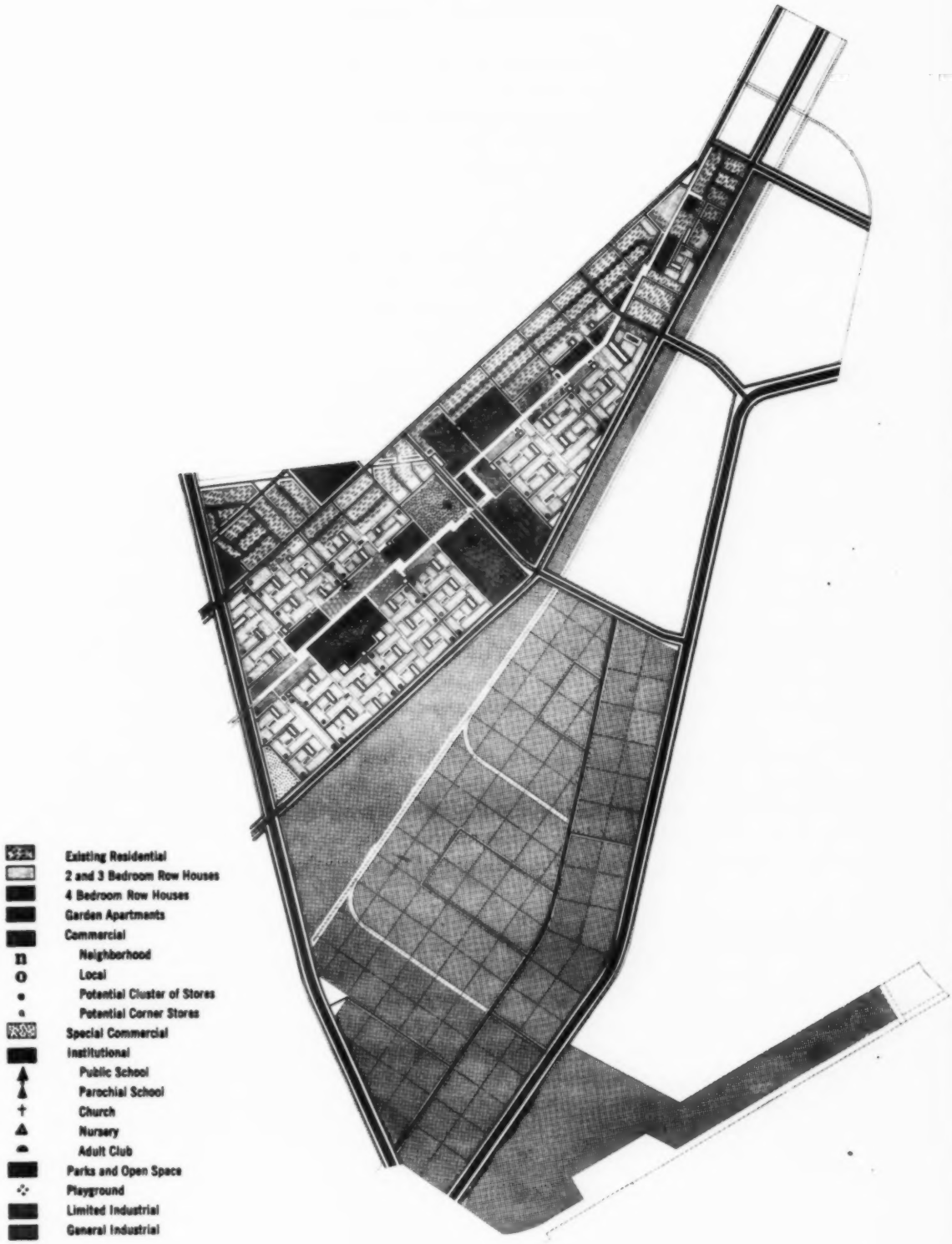
35. The whole complex of greenways and parks provides for the uninterrupted movement of people from the small elemental square within the clusters of houses towards the larger parks, as well as towards the major park and the green areas along Cobbs Creek. They also provide freedom of connection by foot, along a direction vertical to the main green lane.

36. It is proposed that all the parks and green spaces along the center lines of the sector be dedicated to the city which should be responsible for their maintenance. The maintenance of these spaces, however, is going to be simple and relatively easy because of their interconnection and in general because of the rationality of their design.

37. What, on the other hand, should be considered open to careful consideration by the Authorities is the upkeep of the minor squares to be included within every cluster of houses. These can be managed and maintained in more than one way; by the inhabitants who are directly served by them, or partially by them and the city. A similar question exists with respect to ownership of these spaces. Fortunately, on the other hand, the city of Philadelphia enjoys legal provisions which permit considerable flexibility in resolving this problem.

38. The Residential Area. The internal core of the residential part of the community is going to be dominated by a main pedestrian connection, a pleasant esplanade, which is going to begin from the northern part, lead along the major street passing to the west of Sector 1, and then turn into Sector 2 and from there follow the middle of Sectors 4, 7, 11, and 13.

39. It is on this main pedestrian connection that all functions; whether commercial, educational, or cultural, should lie in order to facilitate the formation of an axis of


Existing Residential
2 and 3 Bedroom Row Houses
4 Bedroom Row Houses
Garden Apartments
Commercial
Neighborhood
Local
Potential Cluster of Stores
Potential Corner Stores
Special Commercial
Institutional
Public School
Parochial School
Church
Nursery
Adult Club
Parks and Open Space
Playground
Limited Industrial
General Industrial

internal movement and a center of interest for the whole community. At the same time all these functions should be approached equally well and easily by car.

40. The New Eastwick area is going to have one major shopping center. The natural position for it is at the center of gravity of the new area in Sector 11, at the western quarter of the intersection of Island Avenue and the railway line. Here, it will be of service not only to the new area to be developed, but it will serve the broader areas to the north, and eventually minor communities to the south, around the airport.

41. The major shopping center of the New Eastwick will also become the center of other community functions of higher order. For example, the offices of management of the area, types of governmental, municipal or private offices, functions of social and entertaining nature, which cannot be afforded by smaller communities.

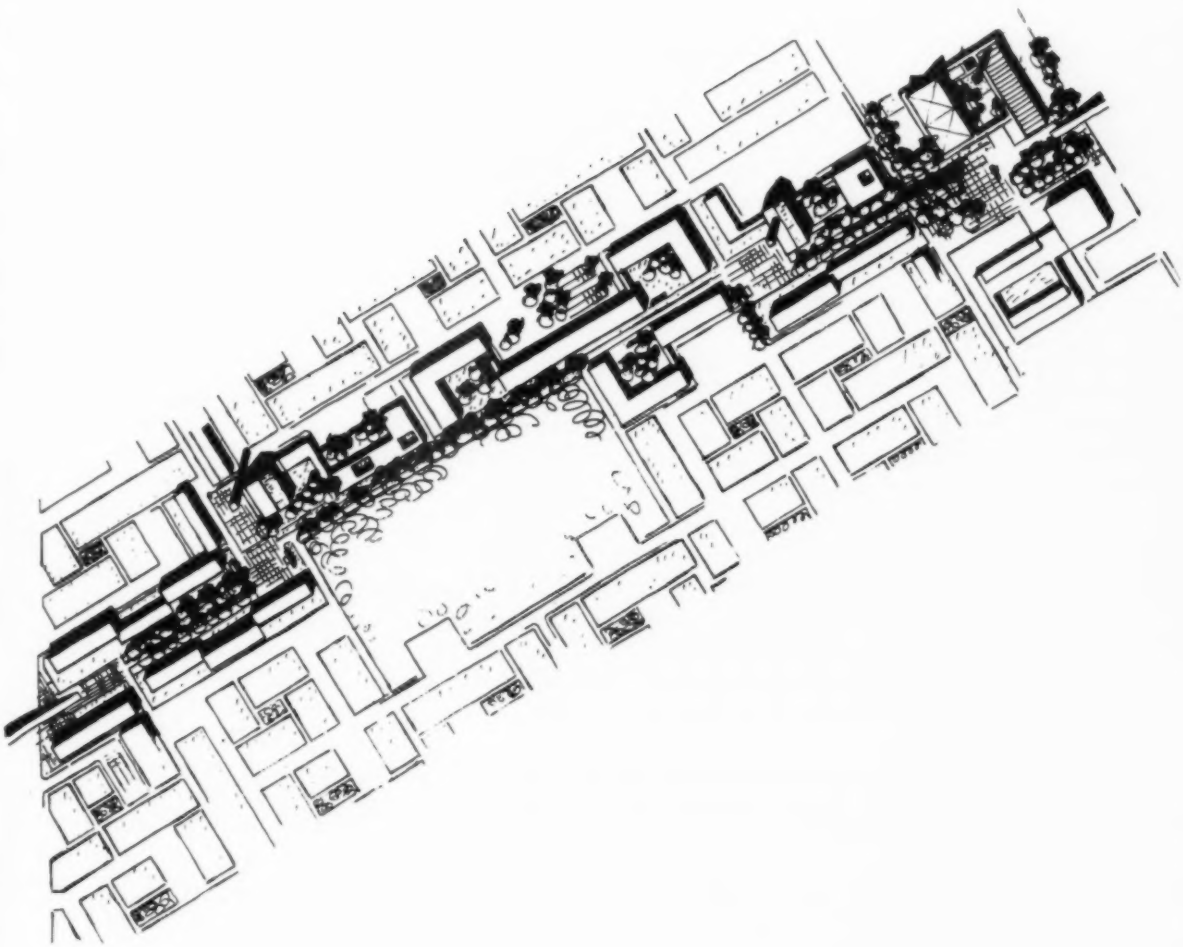
42. Nevertheless, this major shopping center will not serve all the shopping needs of the area. An analysis of the area proves that there is a need for a secondary shopping center. This will be built before the major shopping center since it falls within the boundaries of the Stage I area.

43. These two shopping centers will not satisfy all the need for shopping facilities. We need everywhere a hierarchy of functions. We cannot, for example, have a barber shop only in the shopping center of a bigger area, since it will be easier for the people to walk to the corner barber shop, if available. It is for this reason that shopping is provided at four levels: the major shopping center, the secondary, and shopping centers of two minor orders. These are respectively located at the intersection of the major streets and the secondary collector roads coming into the community, and at the intersection of these collector roads with the cul-de-sac.

44. Apart from these shopping centers of different orders, we will need another type of commercial function, serving mainly the car traffic, such as gas stations, garages, as well as eating places for the people driving on main highways and main roads. Such a center is provided at the northern quarter of the intersection of Island Avenue, with the road dividing the residential from the industrial Sectors 7 and 8.

45. Schools. Within Stage I there will be a necessity for several institutions. The most important of them in order of size are the two schools required by the Authority, one of which should be a public school and the other a parochial school. Since they are of two different kinds and they will both appeal to children of both Sectors 4 and 7, it is considered necessary to provide such a location for them so as to serve both sectors while they may physically belong one to the one sector and the other to the other. This leads to the natural conclusion that both these schools should be along 70th Street which is dividing the two sectors, one on each side of the street.

THE PEDESTRIAN ESPLANADE IN SECTOR 7



46. Thus the children of both Sectors 4 and 7 will be able to attend both schools without crossing any traffic, by using the greenway in the center of the respective sectors, and passing whenever necessary to the other sector through a pedestrian overpass of 70th Street.

47. Apart from the schools we will have the playgrounds. In Sector 4, a part of the playground in existence has a building, a swimming pool, etc., and an effort has been made to save these installations and to use them within the playgrounds of the future, by expanding the area appropriately. Thus, the presently available playgrounds will be incorporated into the future pattern of the sector and will be blended into the main green area of the sector.

48. Industry. It is only by developing an organized industrial district that the most can be achieved in the use of public industrial facilities, such as car pooling, uniformly planned water and electricity supply, waste disposal, and servicing by road and rail. It is only in this way that maximum efficiency can be applied in the use of land, and that industries of differing size and nature can be interrelated to themselves and to the neighboring residential areas, so that the needs of one are not satisfied at the expense of the maximum potential of another. This, on the other hand, can only be accomplished under the organized development of a common developer and manager.

49. At this stage, when little is known of the size and nature of the industries to be interested in Eastwick, two principles can be adopted for providing the groundwork for the application of the above concepts. One is to draw the basic planning ideas which will guide the approach to the problem of rational planning. The other is to provide all the necessary planning for the protection of the residential areas from the nuisances resulting from proximity to the industrial areas.

50. The plan proposed for Sector 8 is meant to be only indicative, committing the developer only insofar as principles are concerned. Ring roads originating in the truck road parallel to Essington Avenue, are going to enter into the industrial area in such a way that no crossing with railway lines takes place. Thus, the basic principle to be adhered to lies in the provision of both rail and road lines, covering most of the area and being interwoven between them and yet not crossing each other.

51. For reasons of rational development we have divided the area indicatively into three acre squares, which is the minimum area needed for industrial developments in this region.

52. The following Table gives data about the acreage planned for various land uses, as compared with those suggested by the Authority's Development Program. With three exceptions our planned acreages compare closely with those suggested by the Authority; for a type of plan which we believe is superior in convenience, livability and economy.

1. Our plan requires about 20% less area for streets and at the same time provides better and safer access, and a better separation of through traffic from local traffic and pedestrian movement. Obviously this plan is more convenient, more livable and more economical.

2. Even so, we have assigned more area to the spine streets, in order to handle the present and future through traffic more satisfactorily.

3. The saving in total area for streets we have assigned to the institutional uses. Thus we provide larger areas for public schools, parochial schools and churches, and, furthermore, we are able to allot over five acres to nurseries.

RESIDENTIAL STAGE I STATISTICS

Note: The figures in the two columns may not be strictly comparable because of unknown differences in the methods of computation.

Residential	Redevelopment Program	Proposed Plan
To be developed	107	107.6
Existing--to remain	78	78.0
Commercial		
Neighborhood shopping	5	5.76
Local Shopping	1	1.43
Special (car service)		2.27
Parks and Open Space		
To be developed	34	34.1*
Existing--to remain	15	15.0
Institutional		
Public Schools	8	9.50
Parochial Schools	5	8.15
Churches	4	6.05
Nurseries, adult clubs and other institutions		5.13
Streets and Rights-of-way		
Spine streets	29	47.2
Minor streets & R/Ws	77	37.8**
	363	358

*Includes 10.6 acres for the central greenway "esplanade."
**Includes 3.8 acres for the "collector" pedestrian greenways.

adult clubs and other institutions which are not specifically recognized in the Development Program. This seems to us a great gain in both the livability and the saleability of the project. Of course, if it is considered wise, the actual development can assign less land to the institutional uses and more to other uses, for example to construction of homes.

53. Houses. A special study has been made of several house types which will be required for the whole Stage I area. An effort has been made to follow the directives of the Redevelopment Authority, and to include in this area both row-house types and garden apartments. In this respect, we state that we are in full agreement with these provisions, as we do not believe that other types of houses could be reasonably included within this area.

54. Since the relative location of the garage in the house plot presents a basic question during the study and selection of a house type, it is felt desirable to envisage and discuss this problem separately. In this respect, three basic possibilities are seen. One is to have the garage within the house itself. The other is to build it separately outside of the house. This solution provides the flexibility of not building the garage right from the beginning but of providing for it later as a separate light construction which can be added by the owner on the basis of well-defined specifications, guaranteeing uniformity of style and expression. The third solution is to have no provision for parking or garaging within the plot, but outside of it.

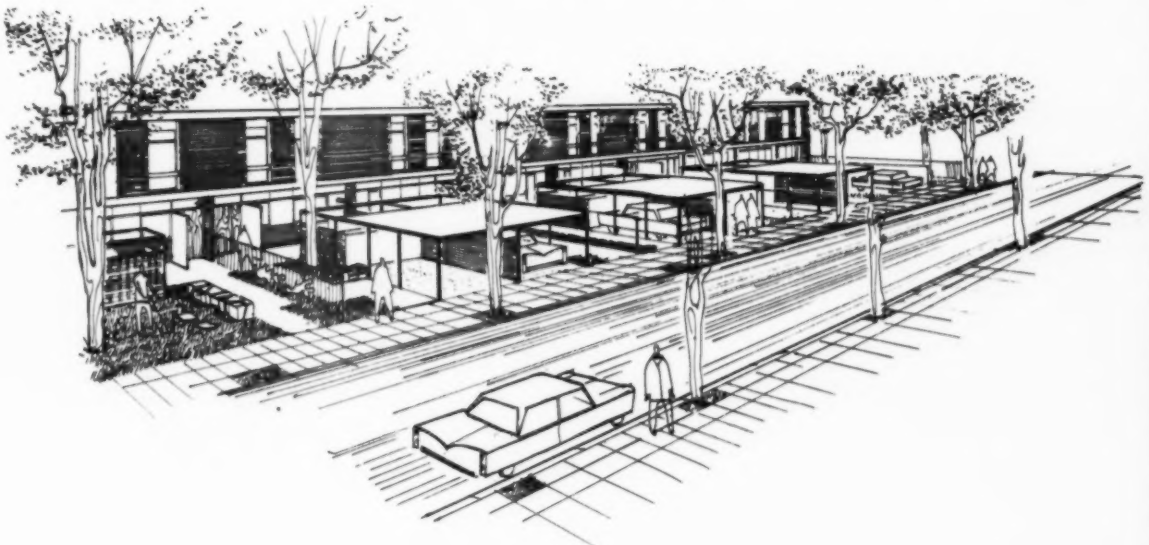
55. Another basic principle, which has been adopted and incorporated in the proposed house types, is that of designing a complete house with all its exterior amenities such as porches, verandas, etc., in such a way that the basic house can be built right away with few or none of these amenities. They can, however, be added later in an easy and economical way and in conformity with a set of specification which guarantee uniformity of style and expression, by the inhabitants themselves.

56. Community Formation. By building houses alone we don't achieve more than a living space for every inhabitant. It is by combining the houses properly, that we achieve making the inhabitant a member of the community he is living in. There has been a basic effort in this whole study to create a human community, where every inhabitant will feel a member of it, wherever he is, whether in his own house, or in his own small surrounding, or in other spaces of the community.

57. This is attempted by the gradual formation of communities of different orders. First, the community which comes next to the single family house, i.e., the minor community, the one which has 40 to 50 houses. In some cases, the element connecting the people and the families among them may be the small garden for the children to play and for the grown-ups to meet from time to time. Another element, which

GARDEN SCENE AT THE REAR OF THE HOUSES WHEN REACHING THE CORE OF THE COMMUNITY

A ROW OF HOUSES TYPE D WITH CARPORTS (LIGHT CONSTRUCTION) ALONG THE STREET



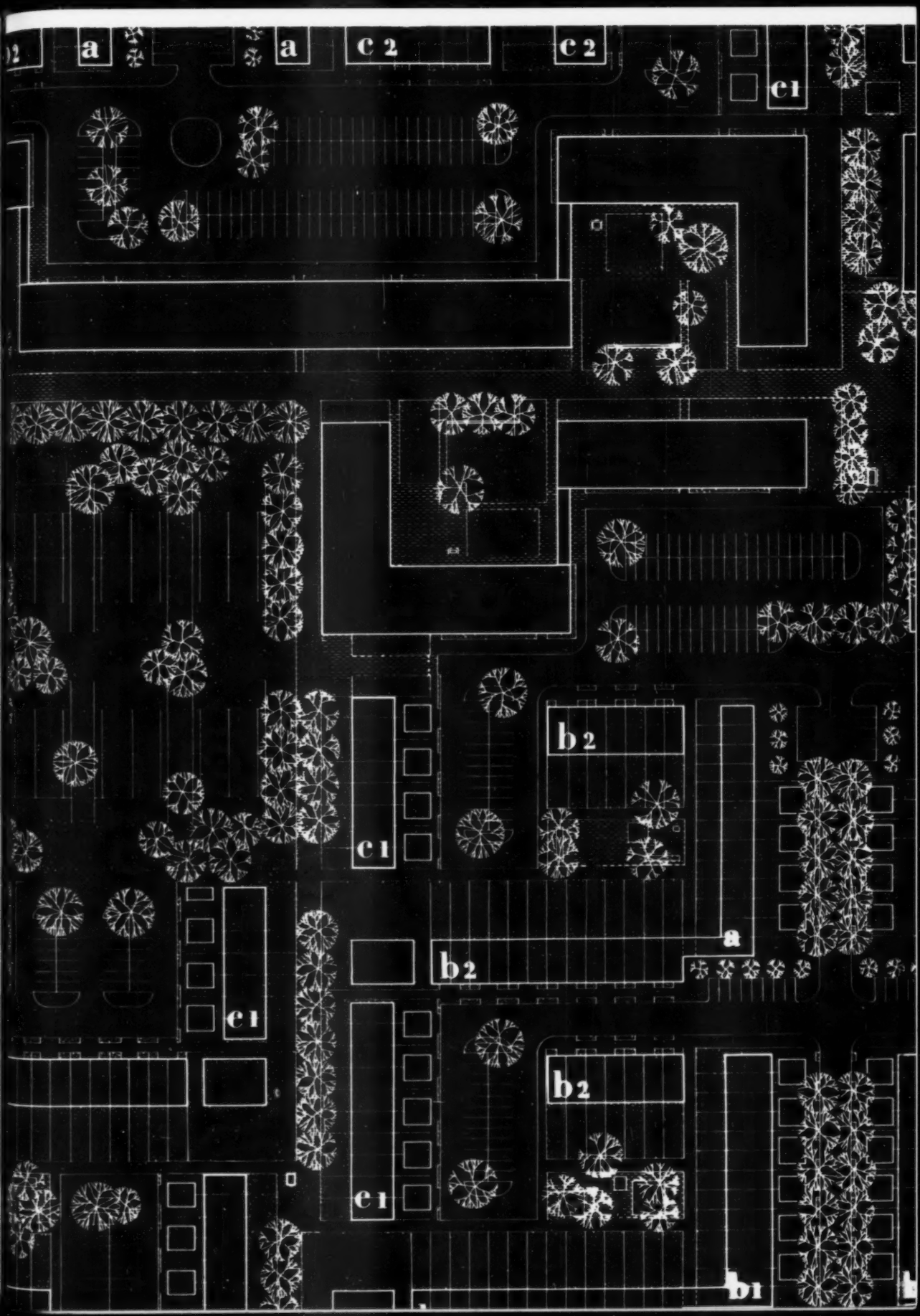
connects the families together, is the common access road, the common motor connection. To this end, a special parking lot is suggested to be created, where parking of the cars of the inhabitants themselves, or of their visitors can be provided.

SITE PLAN NO. 1, STATISTICS

(Based on one typical cluster)

Number of units and kind:		
Type B_1	(Lot size 1440 sq. ft.)	12
Type B_2	(Lot size 1440 sq. ft.)	23
Type C_1	(Lot size 1620 sq. ft.)	10
Special corner types		
(a) Potential shop	(Lot size 2160 sq. ft.)	1
Duplex unit	(Lot size 8100 sq. ft.)	1
		47

Total area (Assuming 50 foot collector and cul-de-sac streets)	131,950 sq. ft. (3.02 acres)
Area of street right-of-way (including cul-de-sacs and car-court)	36,650 sq. ft.
Area less street right-of-way	95,300 sq. ft.
Area of collector walkway and connection to cul-de-sac	3,800 sq. ft.
Area less street and walk right-of-way	91,500 sq. ft. (2.1 acres)
Area of common garden	8,400 sq. ft.
Gross density	15.6 units per acre
Net density	22.4 units per acre
Percentage of streets	27.7%
Percentage of streets and walkways	30.6%


a
a
c 2
c 2
c1
b 2
c1
a
b 2
c1
b 2
c1
b1

58. The real emphasis therefore, is in the interplay between the internal garden, which is meant for the children, and which is surrounded by the gardens of the houses in the back of them, and the parking lot which is meant to serve a different function. These then, cars and children, two completely different functions, are intermeshed. This is the reason why the design provides for a formation of communities which are built around parking lots, around a minor access road in the parking lot which comprises the transportation spine, and around a small green square which is meant to be the internal core.

59. Emphasis, in other words, is based on the formation of minor communities, which are going to have parking lots and gardens in common, but which will properly separate them. Thus everybody, entering by car such a community, will enter from a road where he will get the impression of an urban landscape in which he belongs. The lawn will not be long enough to be tiresome, but it will give a feeling of proper urban space, at the end of this road. As soon as he enters, however, the parking lot, placed vertically to the access road, he will get the feeling of being in a courtyard, the basic element of which is the car. Finally, the third aesthetic element to the access road and the parking lot is the garden space between the houses, which inspires a rather rural feeling.

60. One or two small shops are provided at the corner of this community. This means that even such a small community of 40 or 50 families, the elemental "cluster" of houses, is really a living entity with its own character and spirit, composed of a good number of elements which contribute to community life and atmosphere. These elements are the corner shop, the houses themselves, the road which belongs to them, the parking lot, the backyard communal garden, and the pedestrian green lane which gives access to the major greenway serving all the clusters in the sector.

61. Such a community provides an entrance for the car and an entrance for the pedestrian, each given equal attention and prominence, so that the inhabitant can have a free choice of entrance or exit, based solely on his feeling and temperament, and not on the physical advantages offered to one or the other manner of access.

62. More "clusters," that is more communities of this elemental structure, are interconnected through the collector roads, or if they are not in the proper proximity, through the collector roads and the major streets surrounding the sector.

63. This leads to the formation of a somewhat larger community, consisting of 4 to 6 clusters, i.e., those clusters which are served by the same collector road. Thus if we call this community the "Class II" community, in contrast to the elemental cluster of houses which we call the "Class I" community, we realize that whereas intercommunication between any two houses of the Class I community can be achieved over the cul-de-sac, intercommunication between any two houses of the Class II community can be effected over either a cul-de-sac or a cul-de-sac and a collector road.

64. The Class II community has an entrance by car at the intersection of the collector road which serves it and the major street surrounding the sector. On the other hand, it is flanked on each side by a green lane which connects the houses to the main internal pedestrian lane of the sector, and which gives access to the small garden squares of the community Class I. By analogy, one can call this the "collector green land." Thus the formation of the Class II community is based on the interplay of these two elements, the collector road and the collector green lane.

65. More of these Class II communities for a major Class III community, which coincides with the complete sector. This community is surrounded by major streets while it has a basic greenway in the middle. It is really a community with a balance of traffic roads meant for the car, the main movement of which is towards the exterior of the community, and of pedestrian lanes meant only for the human beings, with their main orientation towards the core of the community.

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